IMPERIAL COUNTY
AIR POLLUTION CONTROL DISTRICT

September 19, 2016
Exceptional Event Documentation
For the Imperial County PM_{10} Nonattainment Area

FINAL DRAFT

December 11, 2018

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ACRONYM	DESCRIPTIONS
AOD	Aerosol Optical Depth
AQI	Air Quality Index
AQS	Air Quality System
BACM	Best Available Control Measures
BAM 1020	Beta Attenuation Monitor Model 1020
BLM	United States Bureau of Land Management
BP	United States Border Patrol
CAA	Clean Air Act
CARB	California Air Resources Board
CMP	Conservation Management Practice
DCP	Dust Control Plan
DPR	California Department of Parks and Recreation
EER	Exceptional Events Rule
EPA	Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
GOES-W/E	Geostationary Operational Environmental Satellite (West/East)
HC	Historical Concentrations
HYSPLIT	Hybrid Single Particle Lagrangian Integrated Trajectory Model
ICAPCD	Imperial County Air Pollution Control District
INPEE	Initial Notification of a Potential Exceptional Event
ITCZ	Inter Tropical Convergence Zone
KBLH	Blythe Airport
KCZZ	Campo Airport
KIPL	Imperial County Airport
KNJK	El Centro Naval Air Station
KNYL/MCAS	Yuma Marine Corps Air Station
KPSP	Palm Springs International Airport
KTRM	Jacqueline Cochran Regional Airport (aka Desert Resorts Rgnl Airport)
PST	Local Standard Time
MMML/MXL	Mexicali, Mexico Airport
MODIS	Moderate Resolution Imaging Spectroradiometer
MPH	Miles Per Hour
MST	Mountain Standard Time
NAAQS	National Ambient Air Quality Standard
NCAR	National Center for Atmospheric Research
NCEI	National Centers for Environmental Information
NEAP	Natural Events Action Plan
NEXRAD	Next-Generation Radar
NOAA	National Oceanic and Atmospheric Administration

nRCP	Not Reasonably Controllable or Preventable
NWS	National Weather Service
PDT	Pacific Daylight Time
PM_{10}	Particulate Matter less than 10 microns
$PM_{2.5}$	Particulate Matter less than 2.5 microns
PST	Pacific Standard Time
QA/QC	Quality Assured and Quality Controlled
QCLCD	Quality Controlled Local Climatology Data
RACM	Reasonable Available Control Measure
RAWS	Remote Automated Weather Station
SIP	State Implementation Plan
SLAMS	State Local Ambient Air Monitoring Station
SMP	Smoke Management Plan
SSI	Size-Selective Inlet
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UTC	Coordinated Universal Time
WRCC	Western Regional Climate Center

VI Introduction

On September 19, 2016, a State and Local Ambient Air Monitoring Station (SLAMS), located in Westmorland (AQS Site Code 060254003) California, measured an exceedance of the National Ambient Air Quality Standard (NAAQS). The Federal Equivalent Method (FEM), Beta Attenuation Monitor Model 1020 (BAM 1020) measured a (midnight to midnight) 24-hr average Particulate Matter less than 10 microns (PM_{10}) concentration of 176 µg/m^3 (**Table 1-1**). PM_{10} 24-hr measurements above 150 µg/m^3 are exceedances of the NAAQS. One of the five SLAMS located in Imperial County measured an exceedance of the PM_{10} NAAQS on September 19, 2016.

TABLE 1-1
CONCENTRATIONS OF PM_{10} ON SEPTEMBER 19, 2016

DATE	MONITORING SITE	AQS ID	POC(s)	HOURS	24-HOUR CONCENTRATION µg/m^3	PM_{10} NAAQS µg/m^3
9/19/2016	**Westmorland**	**06-025-4003**	**3**	**24**	**176**	**150**
9/19/2016	Brawley	06-025-0007	3	24	99	150
9/19/2016	Calexico	06-025-0005	3	24	129	150
9/19/2016	El Centro	06-025-1003	4	24	110	150
9/19/2016	Niland	06-025-4004	3	24	141	150

*All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted[1]

The Imperial County Air Pollution Control District (ICAPCD) has been submitting PM_{10} data from Federal Reference Method (FRM) Size Selective Inlet (SSI) instruments since 1986 into the United States Environmental Protection Agency's (USEPA) Air Quality System (AQS). Prior to 2013 all continuous measured PM_{10} data was non-regulatory, thus measured in local conditions. However, by 2013 ICAPCD began formally submitting continuous FEM PM_{10} data from BAM 1020's into the USEPA managed AQS. Because regulatory consideration of reported data must be in standard conditions, as required by USEPA, all continuous PM_{10} data since 2013 is regulatory. On September 19, 2016, the Westmorland monitor was impacted by elevated particulate matter caused by the transport of fugitive windblown dust from high winds generated by thunderstorms produced by moist, unstable air from Hurricane Paine that surged into southeast California.

This report demonstrates that a naturally occurring event caused an exceedance observed on September 19, 2016, which elevated particulate matter and affected air quality. The report provides concentration to concentration monitoring site analyses supporting a clear causal relationship between the event and the monitored exceedance and provides an analysis supporting the not reasonably controllable or preventable (nRCP) criteria. Furthermore, the

[1] According to the National Institute of Standards and Technology (NIST) Time and Frequency Division the designation of the time of day for specific time zones are qualified by using the term “standard time” or “daylight time”. For year-round use the designation can be left off inferring “local time” daylight or standard whichever is present. For 2016 Pacific Daylight Time (PDT) is March 13 through November 6. https://www.nist.gov/pml/time-and-frequency-division/local-time-faqs#intl

report provides information that the exceedance would not have occurred without the transport of windblown dust from outlying natural open deserts and mountains within the Sonoran Desert, which includes Mexico and Arizona. The document further substantiates the request by the ICAPCD to exclude PM_{10} 24-hour NAAQS exceedance of 176 µg/m^3 (**Table 1-1**) as an exceptional event. This demonstration substantiates that this event meets the definition of the USEPA Regulation for the Treatment of Data Influenced by Exceptional Events (EER).[2]

I.1 Demonstration Contents

Section II - Describes the September 19, 2016 event as it occurred in California and into Imperial County, providing background information of the exceptional event and explaining how the wind driven emissions from the event led to the exceedance at the Westmorland monitor.

Section III – Using time-series graphs, summaries and historical concentration comparisons of the Westmorland station this section discusses and establishes how the September 19, 2016 event affected air quality such that a clear causal relationship is demonstrated between the event and the monitored exceedance. It is perhaps of some value to mention that the time-series graphs include PM_{10} data measured in both local conditions and standard conditions. Measured PM_{10} continuous data prior to 2013 is in local conditions, all other data is in standard conditions. The concentration difference between local and standard conditions has an insignificant impact on any data analysis. Overall, this section provides the evidence that human activity played little or no direct causal role in the September 19, 2016 event and its resulting emissions defining the event as a "natural event".[3]

Section IV - Provides evidence that the event of September 19, 2016 was not reasonably controllable or preventable despite the full enforcement and implementation of Best Available Control Measures (BACM).

Section V - Brings together the evidence presented within this report to show that the exceptional event affected air quality; that the event was not reasonably controllable or preventable; that there was a clear causal relationship between the event and the exceedance, and that the event was a natural event.

I.2 Requirements of the Exceptional Event Rule

The above sections combined comprise the technical requirements described under the Exceptional Events Rule (EER) under 40 CFR §50.14(c)(3)(iv). However, in order for the USEPA to concur with flagged air quality monitoring data, there are additional non-technical requirements.

[2] "Treatment of Data Influenced by Exceptional Events; Final Guidance", 81 FR 68216, October 2, 2016

[3] Title 40 Code of Federal Regulations part 50: §50.1(k) Natural event means an event and its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. For purposes of the definition of a natural event, anthropogenic sources that are reasonably controlled shall be considered to not play a direct role in causing emissions.

I.2.a Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

Although the ICAPCD published, the National Weather Service (NWS) forecast for September 19, 2016, notification of the possibility of an upper level low-pressure system entraining moisture from the south Monday and Tuesday. This would bring a slight chance of thunderstorms to the San Diego region including the coastal areas. The Phoenix NWS office concentrated its forecast discussion primarily for Arizona but did indicate the potential for an increase in moisture and clouds leading to the return of showers and thunderstorm chances along with cooler temperatures.

The published notification, via the ICAPCD's webpage, forecast for September 19, 2016 included the synopsis for the San Diego and Phoenix NWS offices. The San Diego office identified a low-pressure system off the Southern California coast as potentially drawing moisture from Hurricane Paine into Southern California. The moisture would be accompanied by scattered showers and isolated thunderstorms with dry lightning. The expectation was that during the evening hours additional moisture would move northward allowing for greater chances for showers and isolated thunderstorms. The weather story issued by the San Diego NWS office identified impacts from the moisture sure from Hurricane Paine as lightning strikes from the beaches out to the deserts and wet slick roads.

The Phoenix NWS office explained of increasing clouds leading to a good chance of showers and or light rain over portions of southeast California and southwest Arizona by the evening hours.

The daily burn assessment for September 19, 2016 identified clear skies with a potential of elevated winds at maximum mixing heights, increasing the chances for poor air quality. Therefore, a "No Burn" day was declared for September 19, 2016. **Appendix A** contains copies of notices pertinent to the September 19, 2016 event.

I.2.b Initial Notification of Potential Exceptional Event (INPEE) (40 CFR §50.14(c)(2))

States are required under federal regulation to submit measured ambient air quality data into the AQS. AQS is the federal repository of Quality Assured and Quality Controlled (QA/QC) ambient air data used for regulatory purposes. When States intend to request the exclusion of one or more exceedances of a NAAQS as an exceptional event a notification to the Administrator is required. The notification is accomplished by flagging the data in AQS and providing an initial event description.

On October 3, 2016, the US EPA promulgated revisions to the Exceptional Events rule, which included the requirement of an "Initial Notification of Potential Exceptional Event" (INPEE) process. This revised INPEE process requires communication between the US EPA regional office and the State, prior to the development of a demonstration. The intent of the INPEE process is twofold: to determine whether identified data may affect a regulatory decision and whether a State should develop/submit an EE Demonstration.

The ICAPCD made a formal written request to the California Air Resources Board (CARB) to place preliminary flags on SLAMS measured PM_{10} concentrations from the Westmorland monitor on April 17, 2017. The INPEE, for the September 19, 2016 event, was formally submitted by the CARB to USEPA Region 9 on April 24, 2017. Subsequently there after a second revised request to CARB requested preliminary flags on additional days for 2016. **Table 1-1** above provides the PM_{10} measured concentrations for all monitors in Imperial County for September 19, 2016. A brief description of the meteorological conditions provided to CARB, provided preliminary information that indicated a potential natural event had occurred on September 19, 2016.

I.2.c Documentation that the public comment process was followed for the event demonstration that was flagged for exclusion (40 CFR §50.14(c)(3)(v))

The ICAPCD posted, for a 30-day public review, a draft version of this demonstration on the ICAPCD webpage and published a notice of availability in the Imperial Valley Press on August 17, 2018. The notice advised the public that comments were being solicited regarding this demonstration, which supports the request, by the ICAPCD, to exclude the measured concentrations of 177 µg/m^3, which occurred on September 19, 2016 in Westmorland (**Table 1-1**). The final closing date for comments was September 17, 2018. **Appendix A** contains a copy of the public notice affidavit along with any comments received by the ICAPCD for submittal as part of the demonstration (40 CFR §50.14(c)(3)(v)).

I.2.d Documentation submittal supporting an Exceptional Event Flag (40 CFR §50.14(c)(3)(i))

States that have flagged data as a result of an exceptional event and who have requested an exclusion of said flagged data are required to submit a demonstration that justifies the data exclusion to the USEPA in accordance with the due date established by USEPA during the INPEE process (40 CFR §50.14(c)(2)). Currently, bi-weekly meetings between USEPA, CARB and Imperial County are set to discuss each flagged exceedance for 2016.

The ICAPCD, after the close of the comment period and after consideration of the comments will submit this demonstration along with all required elements, including received comments and responses to USEPA Region 9 in San Francisco, California. The submittal of the September 19, 2016 demonstration will have a regulatory impact upon the development and ultimate submittal of the PM_{10} State Implementation Plan for Imperial County in 2018.

I.2.e Necessary demonstration to justify an exclusion of data under (40 CFR§50.14(c)(3)(iv))

A This demonstration provides evidence that the event, as it occurred on September 19, 2016, satisfies the definition in 40 CFR §50.1(j) and (k) for an exceptional event.

- a The event created the meteorological conditions that entrained emissions and caused the exceedance.
- b The event clearly "affects air quality" such that there is the existence of a clear causal relationship between the event and the exceedance.

c Analysis demonstrates that the event-influenced concentrations compared to concentrations at the same monitor at other times supports the clear causal relationship.
d The event "is not reasonably controllable and not reasonably preventable."
e The event is "caused by human activity that is unlikely to recur at a particular location or [is] a natural event."
f The event is a "natural event" where human activity played little or no direct causal role.

B This demonstration provides evidence that the exceptional event affected air quality in Imperial County by demonstrating a clear causal relationship between the event and the measured concentration in Westmorland.

C This demonstration provides evidence of the measured concentrations to concentrations at the same monitor at other times supporting the clear causal relationship between the event and the affected monitor.

VI September 19, 2016 Conceptual Model

This section provides a summary description of the meteorological and air quality conditions under which the September 19, 2016 event unfolded in Imperial County. The subsection elements include

- A description and map of the geographic setting of the air quality and meteorological monitors
- A description of Imperial County's climate
- An overall description of meteorological and air quality conditions on the event day.

II.1 Geographic Setting and Monitor Locations

According to the United States Census Bureau, Imperial County has a total area of 4,482 square miles of which 4,177 square miles is land and 305 square miles is water. Much of Imperial County is below sea level and is part of the Colorado Desert an extension of the larger Sonoran Desert (**Figure 2-1)**.The Colorado Desert not only in includes Imperial County but a portion of San Diego County.

FIGURE 2-1
COLORADO DESERT AREA IMPERIAL COUNTY

Fig 2-1: 1997 California Environmental Resources Evaluation System. According to the United States Geological Survey (USGS) Western Ecological Research Center the Colorado Desert bioregion is part of the bigger Sonoran Desert Bioregion which includes the Colorado Desert and Upper Sonoran Desert sections of California and Arizona, and a portion of the Chihuahuan Basin and Range Section in Arizona and New Mexico (Forest Service 1994)

A notable feature in Imperial County is the Salton Sea, which is at approximately 235 feet below sea level. The Chocolate Mountains are located east of the Salton Sea and extend in a northwest-southeast direction for approximately 60 miles (**Figure 2-2)**. In this region, the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect the northern-most extensions of the East Pacific rise. Consequently, the region is subject to earthquakes and the crust is being stretched, resulting in a sinking of the terrain over time.

FIGURE 2-2
SURROUNDING AREAS OF THE SALTON SEA

Fig 2-2: Image courtesy of the Image Science and Analysis Laboratory NASA Johnson Space Center, Houston Texas

All of the seven incorporated cities, including the unincorporated township of Niland, are surrounded by agricultural fields to the north, east, west and south (**Figure 2-6)**. Together, the incorporated cities, including Niland, and the agricultural fields make what is known as the Imperial Valley. Surrounding the Imperial Valley are desert areas found on the eastern and western portions of Imperial County.

The desert area, found within the western portion of Imperial County is of note because of its border with San Diego County. From west to east, San Diego County stretches from the Pacific Ocean to its boundary with Imperial County. San Diego County has a varied topography. On its western side is 70 miles (110 km) of coastline. Most of San Diego between the coast and the Laguna Mountains consists of hills, mesas, and small canyons. Snow-capped (in winter) mountains rise to the northeast, with the Sonoran Desert to the far east. Cleveland National Forest is spread across the central portion of the county, while the Anza-Borrego Desert State Park occupies most of the northeast. The southeastern portion of San Diego County is comprised of distinctive Peninsular mountain ranges. The mountains and deserts of San Diego comprise the eastern two-thirds of San Diego County and are primarily undeveloped back county with a native plant community known as chaparral. Of the nine major mountain ranges within San Diego County, the In-Ko-Pah Mountains and the Jacumba Mountains border Mexico and Imperial County.

Both mountain ranges provide the distinctive weathered dramatic piles of residual boulders that can be seen while driving Interstate 8 from Imperial County through Devil's Canyon and In-Ko-Pah Gorge. Interstate 8 runs along the US border with Mexico from San Diego's Mission Bay to just southeast of Casa Grande Arizona.

FIGURE 2-3
JACUMBA PEAK

Fig 2-3: The Jacumba Mountains reach an elevation of 4,512 feet (1,375 m) at Jacumba Peak, near the southern end of the chain. Source: Wikipedia at https://en.wikipedia.org/wiki/Jacumba_Mountains

Northwest and northeast of the Jacumba Mountains is the Tierra Blanca Mountains, the Sawtooth Mountains and Anza-Borrego Desert State Park. Within the mountain ranges and the Anza-Borrego Desert State Park, there exists the Vallecito Mountains, the Carrizo Badlands, the Carrizo Impact Area, Coyote Mountains and the Volcanic Hills to name of few. Characteristically, these areas all have erosion that has occurred over time that extends from the Santa Rosa Mountains into northern Baja California in Mexico. For example, the Coyote Mountains consists of sand dunes left over from the ancient inland Sea of Cortez. Much of the terrain is still loose dirt, interspersed with sandstone and occasional quartz veins. The nearest community to the Coyote Mountain range is the community of Ocotillo. Of interest are the fossilized and hollowed out sand dunes that produce wind caves.

FIGURE 2-4
ANZA-BORREGO DESERT STATE PARK
CARRIZO BADLANDS

Fig 2-4: View southwest across the Carrizo Badlands from the Wind Caves in Anza-Borrego Desert State Park. Source: Wikipedia at https://en.wikipedia.org/wiki/Carrizo_Badlands

The Carrizo Badlands, which includes the Carrizo Impact Area used by the US Navy as an air-to-ground bombing range during World War II and the Korean War, lies within the Anza-Borrego Desert State Park. The Anza-Borrego Desert State Park is located within the Colorado Desert, is the largest state park in California occupying eastern San Diego County, reaching into Imperial and Riverside counties. The two communities within Anza-Borrego Desert State Park are Borrego Springs and Shelter Valley.

The Anza-Borrego Desert State Park lies in a unique geologic setting along the western margin of the Salton Trough. The area extends north from the Gulf of California to San Gorgonio Pass and from the eastern rim of the Peninsular Ranges eastward to the San Andreas Fault zone along the far side of the Coachella Valley. The Anza-Borrego region changed gradually over time from intermittently being fed by the Colorado River Delta to dry lakes and erosion from the surrounding mountain ranges. The area located within the southeastern and northeastern section of San Diego County is a source of entrained fugitive dust emissions that impact Imperial County when westerly winds funnel through the unique landforms causing in some cases wind tunnels that cause increases in wind speeds.

Historical observations have indicated that the desert slopes and mountains of San Diego are a source of fugitive emissions along with those deserts located to the east and west of Imperial County, which extend into Mexico (Sonoran Desert, **Figure 2-7**). Combined, the desert areas and mountains of San Diego and the desert areas that extend into Mexico are sources of dust emissions, which affect the Imperial County during high wind events.

FIGURE 2-5
ANZA-BORREGO DESERT STATE PARK
DESERT VIEW FROM FONT'S POINT

Fig 2-5: Desert view from Font's Point. Source: Font's Point Anza-Borrego Photographed by and copyright of (c) David Corby; Wikipedia at https://en.wikipedia.org/wiki/Anza-Borrego_Desert_State_Park

FIGURE 2-6
LOCATION AND TOPOGRAPHY OF IMPERIAL COUNTY

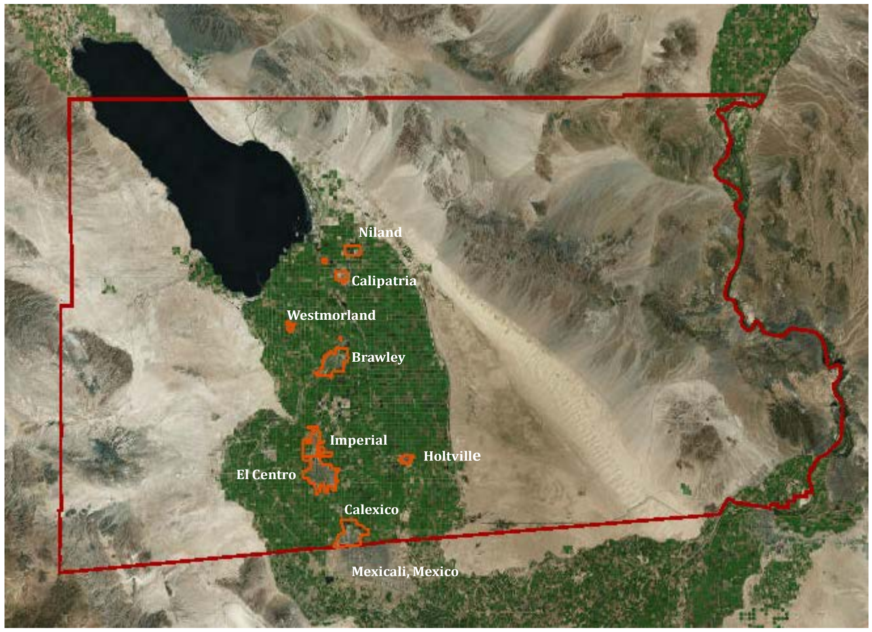

Fig 2-6: Depicts the seven incorporated cities within Imperial Valley - City of Calipatria, City of Westmorland, City of Brawley, City of Imperial, City of El Centro, City of Holtville, City of Calexico. Niland is unincorporated. Mexicali, Mexico is to the south.

FIGURE 2-7
DESERTS IN CALIFORNIA, YUMA AND MEXICO

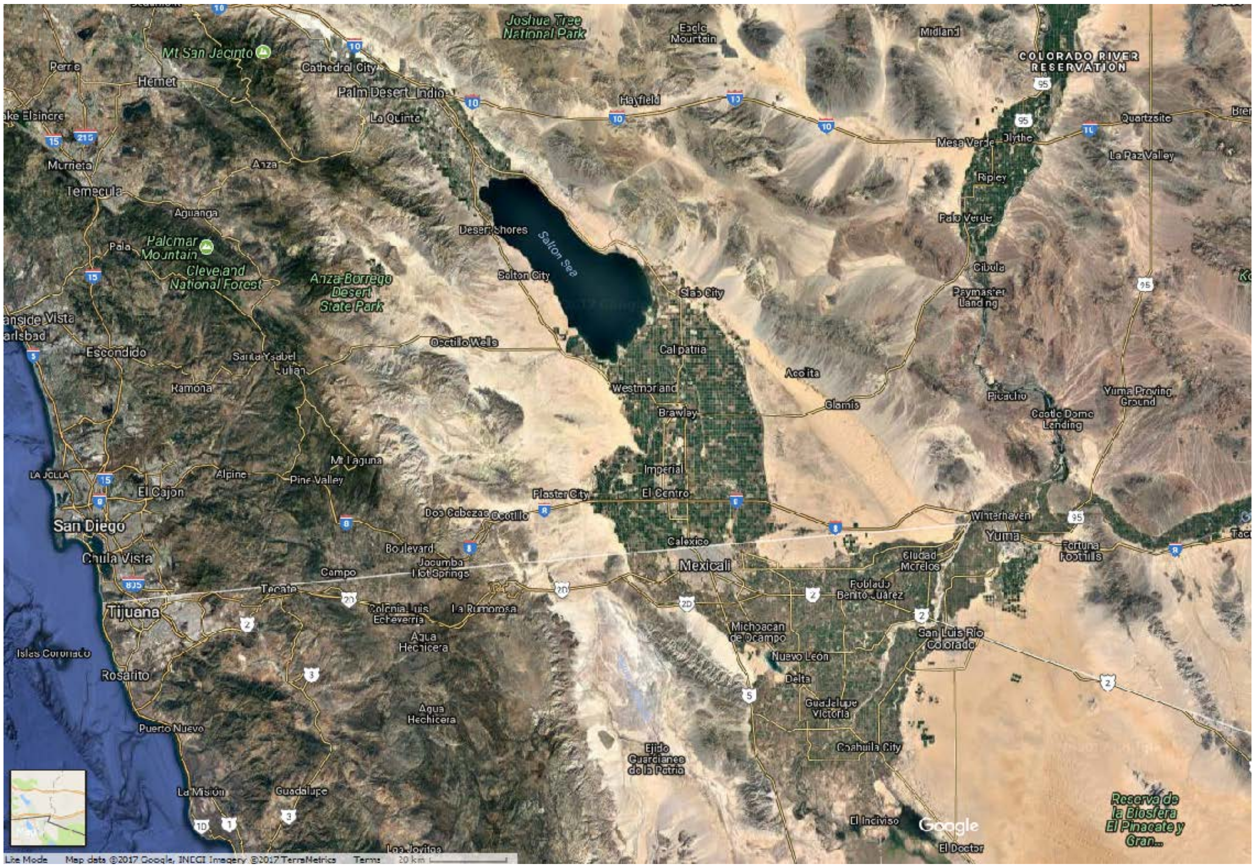

Fig 2-7: Depicts the Sonoran Desert as it extends from Mexico into Imperial County. Source: Google Earth Terra Matrics.

The air quality and meteorological monitoring stations used in this demonstration are shown in **Figure 2-8**. Of the five SLAMS within Imperial County, four stations measure both meteorological and air quality data. These SLAMS are located in Calexico, El Centro, Westmorland, and Niland; the station located in Brawley only measures air quality. Other air monitoring stations measuring air quality and meteorological data used for this demonstration include stations in eastern Riverside County, southeastern San Diego County and southwestern Arizona (Yuma County) (**Figure 2-8 and Table 2-1)**.

As mentioned above, the PM_{10} exceedances on September 19, 2016, occurred at the Brawley, El Centro, and Westmorland stations. The Brawley, El Centro, and Westmorland stations are regarded as the “northern” monitoring sites within the Imperial County air monitoring network. In order to properly analyze the contributions from meteorological conditions occurring on September 19, 2016, other meteorological sites were used in this demonstration which include airports in eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), Imperial County, and other sites relevant to the wind event, such as within northern Mexico. (**Figure 2-8 and Appendix B)**.

FIGURE 2-8
MONITORING SITES IN AND AROUND IMPERIAL COUNTY

Fig 2-8: Depicts a select group of meteorological and PM_{10} monitoring sites in Imperial County, eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), and northern Mexico. The image provides the location of potential sites used to gather data in support an Exceptional Event Demonstration. Source: Google Earth

In addition to meteorological sites, there are non-regulatory PM_{10} sites located around the Salton Sea that maybe referenced as an aid to help the reader understand the direction and velocity of winds that affect Imperial County. Unless, otherwise specifically indicated concentration references do not imply emissions from the surrounding playa of the Salton Sea. Three sites, in specific, are the Salton City air monitoring station, the Naval Test Base air monitoring station and the Sonny Bono air monitoring station. These stations are privately owned and non-regulatory (**Figures 2-9 to 2-12**). The Salton City station is located 33.27275°N latitude and 115.90062˚W longitude, on the western edge of the Salton Sea (**Figure 2-9**). The station abuts a water reservoir along the Salton Sea with surrounding chaparral vegetation and unpaved open areas and roads. The Naval Test Base station is located 33.16923°N latitude and 115.85593˚W longitude, on the southwestern edge of the Salton Sea (**Figure 2-11**). The station sits on an abandoned US Military site, still owned by the Department of Defense. Unlike the Salton City station, light chaparral vegetation and sandy open dune areas surround the Naval Test Base station. Directly to the west of the station is an orchard. The Sonny Bono station is located 33.17638°N latitude and 115.62310˚W longitude, on the southern portion of the Salton Sea within the Sonny Bono Salton Sea Wildlife Refuge. The Sonny Bono Salton Sea National Wildlife Refuge is 40 miles north of the Mexican border at the southern end of the Salton Sea within the Sonoran Desert. The Refuge has two separate managed units, 18 miles apart. Each unit contains wetland habitats, farm fields, and tree rows. The land of the Salton Sea Refuge is flat, except for Rock Hill, a small, inactive volcano, located near Refuge Headquarters. Bordering the Refuge is the Salton Sea on the north and farmlands on the east, south, and west.

FIGURE 2-9
SALTON CITY AIR MONITORING STATION

Fig 2-9: Depicts the Salton City air monitoring (circled) site operated by a private entity. View site photos at the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-10
SALTON CITY AIR MONITORING STATION
WEST

Fig 2-10: Photograph taken by the California Air Resources Board audit team in 2017. The photograph taken from the west facing the probe.
https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-11
NAVAL TEST BASE AIR MONITORING STATION

Fig 2-11: Depicts the Naval Test Base air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13603&date=17

FIGURE 2-12
NAVAL TEST BASE AIR MONITORING STATION
WEST

Fig 2-12: Photograph taken by the California Air Resources Board audit team in 2017. The photograph taken from the west facing the probe. https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-13
SONNY BONO AIR MONITORING STATION

Fig 2-13: Depicts the Sonny Bono air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-14
SONNY BONO SALTON SEA NATIONAL WILDLIFE REFUGE

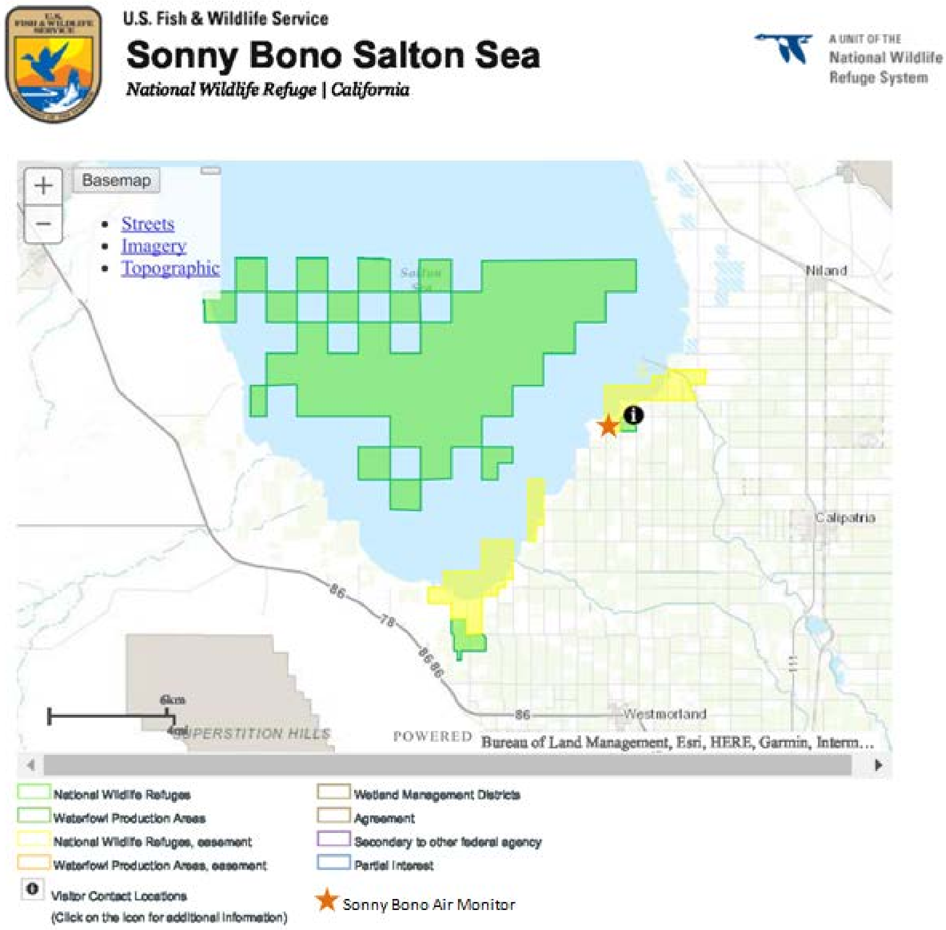

Fig 2-14: The Sonny Bono Wildlife Refuge has about 2,000 acres that are farmed and managed for wetlands. In 1998, the Refuge was renamed after Congressman Sonny Bono, who helped inform the U.S. Congress of the environmental issues facing the Salton Sea as well as acquiring funding for this Refuge to help it respond to avian disease outbreaks and other habitat challenges at the Salton Sea. Source: https://www.fws.gov/refuge/Sonny_Bono_Salton_Sea/about.html

TABLE 2-1
MONITORING SITES IN IMPERIAL COUNTY, RIVERSIDE COUNTY AND ARIZONA
SEPTEMBER 19, 2016

Monitor Site Name	*Operator	Monitor Type	AQS ID	AQS PARAMETER CODE	ARB Site Number	Elevation (meters)	24-hr PM_{10} (µg/m^3) Avg	1-hr PM_{10} (µg/m^3) Max	**Time of Max Reading	Max Wind Speed (mph)	**Time of Max Wind Speed
IMPERIAL COUNTY											
Brawley-Main Street #2	ICAPCD	Hi-Vol Gravimetric	06-025-0007	(81102)	13701	-15	-	-	-	-	-
		BAM 1020					100	435	16:00		
Calexico-Ethel Street	CARB	BAM 1020	06-025-0005	(81102)	13698	3	130	807	15:00	-	-
El Centro-9th Street	ICAPCD	BAM 1020	06-025-1003	(81102)	13694	9	110	544	14:00	14	17:00
Niland-English Road	ICAPCD	Hi-Vol Gravimetric	06-025-4004	(81102)	13997	-57	-	-	-	25	17:00
		BAM 1020					141	995	16:00		
Westmorland	ICAPCD	BAM 1020	06-025-4003	(81102)	13697	-43	177	995	16:00	16	16:00
RIVERSIDE COUNTY											
Palm Springs Fire Station	SCAQMD	TEOM	06-065-5001	(81102)	33137	174	31	63	18:00	12	20:00
Indio (Jackson St.)	SCAQMD	TEOM	06-065-2002	(81102)	33157	1	-	-	-	-	
ARIZONA – YUMA											
Yuma Supersite	ADEQ	TEOM	04-027-8011	(81102)	N/A	60	1106	101	16:00	-	-

*CARB = California Air Resources Board
*ICAPCD = Air Pollution Control District, Imperial County
*SCAQMD = South Coast Air Management Quality District
*ADEQ =Arizona Department of Environmental Quality

**Time represents the actual time/hour of the measurement in question according to the zone time (PST unless otherwise noted)
Blank spaces indicates either missing data measurements or the instrument does not measure the parameter

II.2 Climate

As mentioned above, Imperial County is part of the Colorado Desert, which is a subdivision of the larger Sonoran Desert (**Figure 2-15**) encompassing approximately 7 million acres (28,000 km^2). The desert area encompasses Imperial County and includes parts of San Diego County, Riverside County, and a small part of San Bernardino County.

FIGURE 2-15
SONORAN DESERT REGION

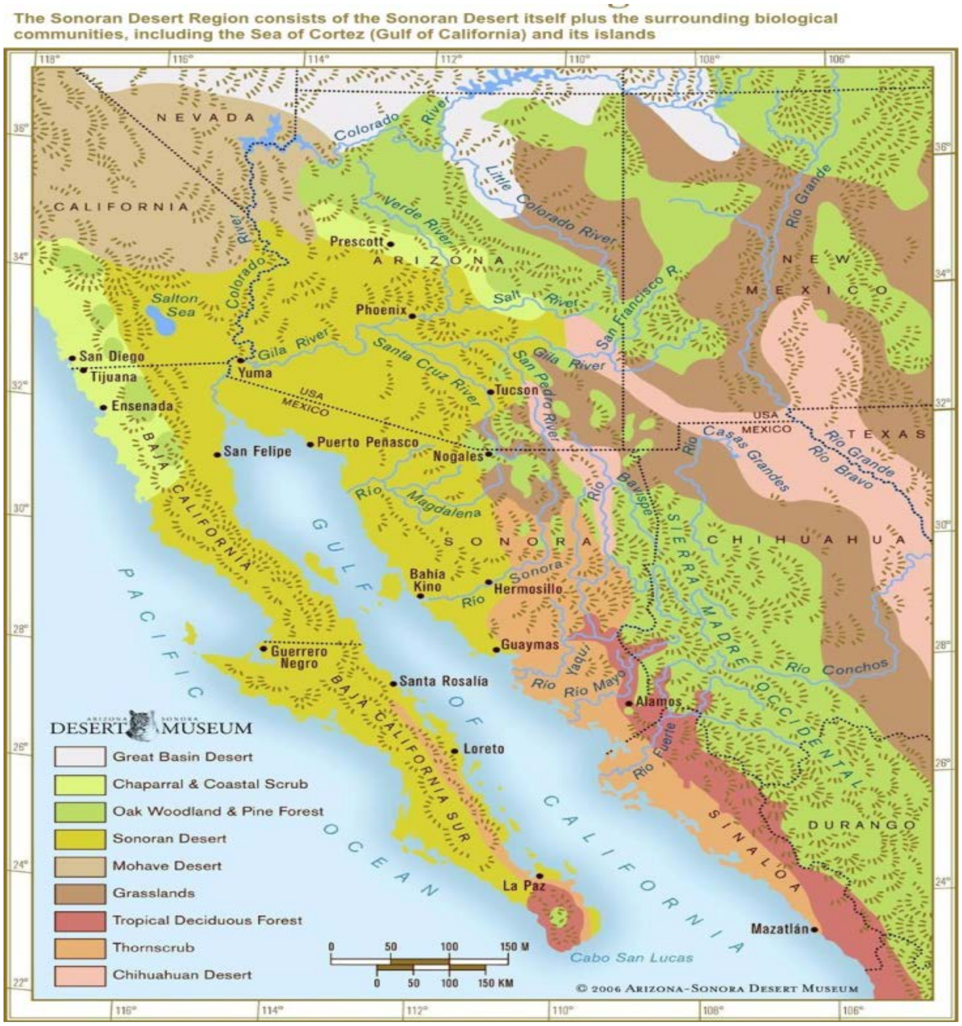

Fig 2-15: Depicts the magnitude of the region known as the Sonoran Desert. Source: Arizona-Sonora Desert Museum at http://desertmuseum.org/center/map.php

The majority of the Colorado Desert lies at a relatively low elevation, below 1,000 feet (300 m), with the lowest point of the desert floor at 275 feet (84 m) below sea level at the Salton Sea. Although the highest peaks of the Peninsular Range reach elevations of nearly 10,000 feet (3,000 m), most of the region's mountains do not exceed 3,000 feet (910 m).

In the Colorado Desert (Imperial County), the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect to the northern-most extensions of the East Pacific Rise. Consequently, the region is subject to earthquakes, and the crust is being stretched, resulting in a sinking of the terrain over time.

The Colorado Desert's climate distinguishes it from other deserts. The region experiences greater summer daytime temperatures than higher-elevation deserts and almost never experiences frost. In addition, the Colorado Desert experiences two rainy seasons per year (in the winter and late summer), especially toward the southern portion of the region which includes a portion of San Diego County. The Colorado Desert portion of San Diego County receives the least amount of precipitation. Borrego Springs, the largest population center within the San Diego desert region averages 5 inches of rain with a high evaporation rate. By contrast, the more northerly Mojave Desert usually has only winter rains.

The west coast Peninsular Ranges, or other west ranges, of Southern California–northern Baja California, block most eastern Pacific coastal air and rains, producing an arid climate. Other short or longer-term weather events can move in from the Gulf of California to the south, and are often active in the summer monsoons. These include remnants of Pacific hurricanes, storms from the southern tropical jet stream, and the northern Inter Tropical Convergence Zone (ITCZ).

The arid nature of the region is demonstrated when historic annual average precipitation levels in Imperial County average 2.64” (**Figure 2-16)**. During the 12 month period prior to the September 19, 2016 event, Imperial County recorded a total annual precipitation of 0.83 inches. Such arid conditions, as those preceding the event, result in soils that are particularly susceptible to particulate suspension by the elevated gusty winds.

FIGURE 2-16
IMPERIAL COUNTY HISTORICAL WEATHER

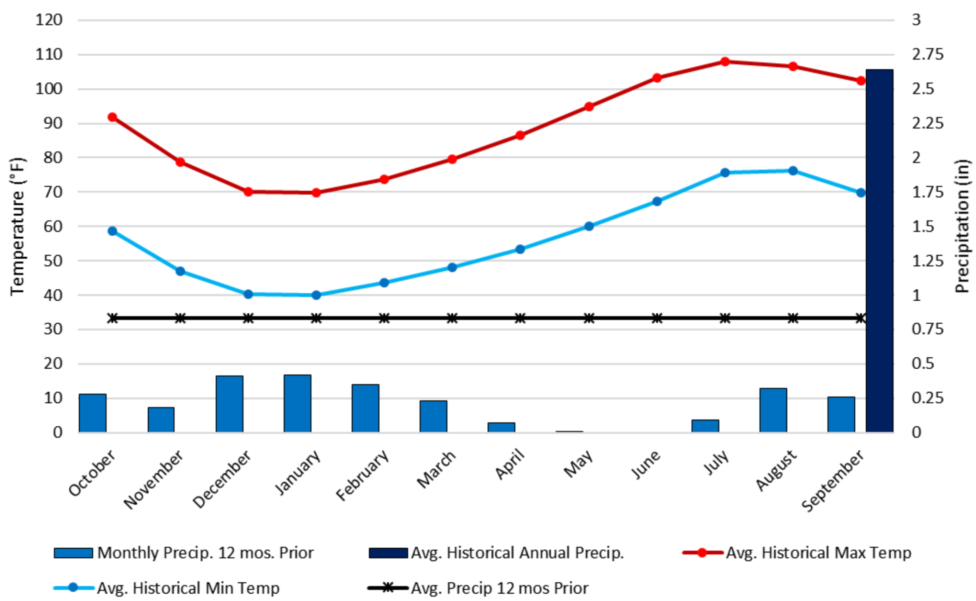

Fig 2-16: In the months prior to September 19, 2016, the region had suffered abnormally low total precipitation of 0.83 inches. Average annual precipitation is 2.64 inches. Meteorological data courtesy of Western Regional Climate Center (WRCC) and Weather Underground http://www.wrcc.dri.edu/cgi-bin/climain.pl?ca2713

The NWS explains that the speed of any wind resulting from a weather system is directly proportional to the change in air pressure, called a pressure gradient, such that when the pressure gradient increases so does the speed of the wind.[4] Because the pressure gradient is just the difference in pressure between high and low pressure areas, changes in weather patterns may recur seasonally.

Typically, high pressure brings clear skies and with no clouds, there is more incoming shortwave solar radiation causing temperatures to rise. When surface winds become light, the cooling of the air produced directly under a high-pressure system can lead to a buildup of particulates in urban areas under an elongated region of relatively high atmospheric pressure or ridge causing widespread haze. Conversely, a trough is an elongated region of relatively low atmospheric pressure often associated with fronts. Troughs may be at the surface, or aloft under various conditions. Most troughs bring clouds, showers, and a wind shift, particularly following the passage of the trough.

While windblown dust events in Imperial County during the fall, winter, and spring are often due to strong winds associated with low-pressure systems and cold fronts, windblown dust events during the summer monsoon season are often due to wind flow aloft from the East or South-East. This phenomenon is known as the North American Monsoon (NAM)[5]. The NAM occurs when there is a shift in wind patterns during the summer, which occurs as Mexico and the southwest United States warm under intense solar heating reversing airflow from dry land areas to moist ocean areas. Consequently, the prevailing winds start to flow from moist ocean areas into dry land areas (**Figure 2-17**).

[4] NWS JetStream – Origin of Wind http://www.srh.noaa.gov/jetstream/synoptic/wind.html

[5] National Weather Service document "North American Monsoon" public domain material from the NWS Forecast Office Tucson, Arizona

FIGURE 2-17
WEATHER PATTERN OF THE NORTH AMERICAN MONSOON

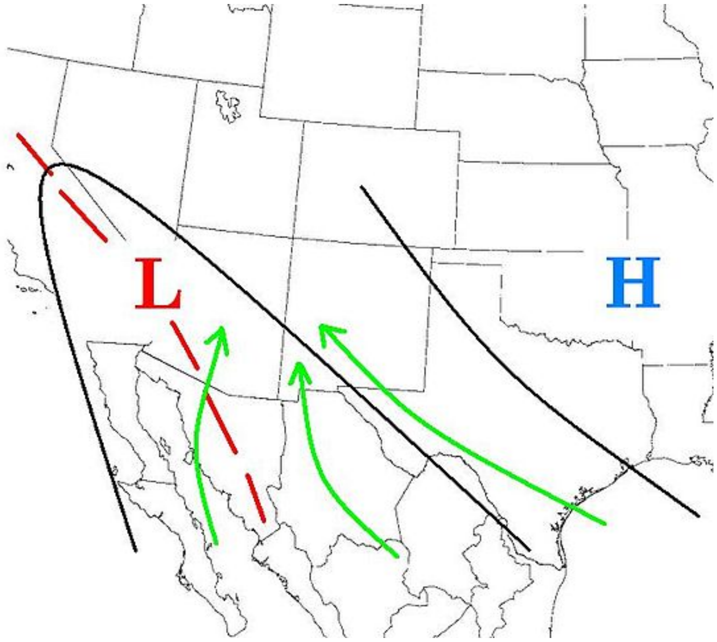

Fig 2-17: Weather pattern of the North American Monsoon. The North American monsoon, variously known as the Southwest monsoon, the Mexican monsoon, or the Arizona monsoon is a pronounced increase in rainfall from an extremely dry June to a rainy July over large areas of the southwestern United States and northwestern Mexico. Image courtesy of Wikipedia "North American Monsoon."

The NAM circulation typically develops in late May or early June over southwest Mexico. By mid to late summer, thunderstorms increase over the "core" region of the southwest United States and northwest Mexico[6]. The transport of moisture into Mexico, Arizona and the southwestern United States can come quickly and sometimes dramatically , known as "bursts" and "breaks" which can unleash violent flash floods, thousands of lightning strikes, crop-damaging hail, and walls of damaging winds and blowing dust.[7]

The monsoon typically arrives in mid to late June over northwest Mexico and early July over the southwest United States. While the southern areas of Mexico experience a low level monsoon circulation, transported primarily from the Gulf of California and the eastern Pacific, an upper level monsoon (or subtropical) ridge develops over the southern High Plains and northern Mexico. Thus, by late June or early July the ridge shifts into the southern Plains or southern Rockies creating less resistance for the mid and upper level moisture streams to enter the United States. If the ridge is too close to a particular area, the sinking air, at its center suppresses

[6] According to the NWS Tucson Arizona regional office report affected areas include the United States, Arizona, New Mexico, Sonora, Chihuahua, Sinaloa and Durango.
[7] 2004: The North American Monsoon. Reports to the Nation on our Changing Planet. NOAA/National Weather Service. Available on line at: http://www.cpc.noaa.gov/products/outreach/Report-to-the-Nation-Monsoon_aug04.pdf

thunderstorms and can result in a significant monsoon “break”. However, if the ridge sets up in a few key locations, widespread and potentially severe thunderstorms can develop.

In Imperial County, isolated thunderstorms begin to develop, mainly during the hottest part of the day. Because the upper level steering pattern and disturbances around the ridge are critical for influencing where thunderstorms develop on any given day when lower levels of the atmosphere remain dry causing most of the rain not to reach the ground the creation of strong, gusty and highly variable winds occurs. On occasion, a few of these thunderstorms are pushed by the winds into the lower deserts during the evening hours.

Thus, when high humid air is pushed up the Gulf of California, also known as a gulf surge the most common synoptic pattern is an easterly wave over central Mexico and an intensifying thermal low over the desert southwest. Although current studies include the relationship of gulf surges to tropical easterly and midlatitude westerly waves, additional study remains in order to understand why some gulf surges contain sufficient precipitation while others do not. Suffice to say that during the NAM season there are northward surges of relatively cool, moist maritime air from the eastern tropical Pacific into the southwestern United States via the Gulf of California (e.g. Hales 1972; Brenner 1974; Stensrud et al. 1997; Fuller and Stensrud 2000). These events are related to the amount of convective activity in northwestern Mexico and portions of the southwestern United States.[8]

FIGURE 2-18
CONCEPTUAL DIAGRAM OF GULF SURGE TRIGGER

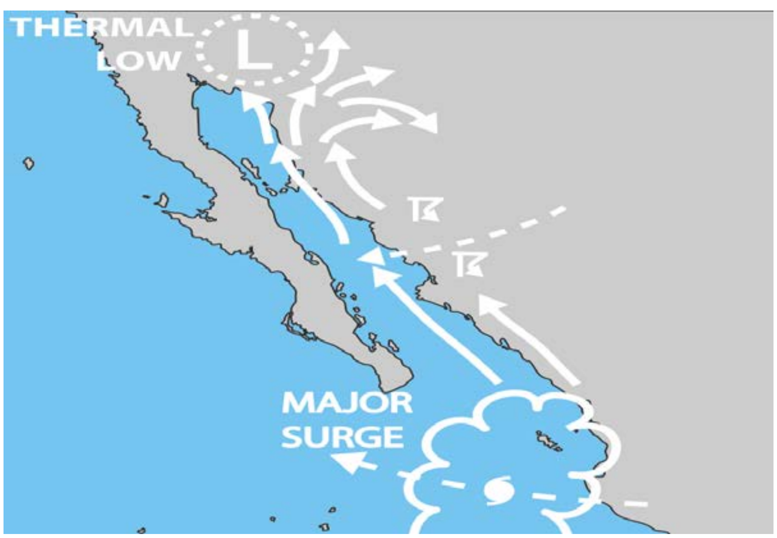

Fig 2-18: A conceptual diagram of how a tropical system can trigger a gulf surge. Source: Gulf of California moisture surge Wikipedia The Free Encyclopedia https://en.wikipedia.org/wiki/Gulf_of_California_moisture_surge

[8] Relationships Between Gulf of California Moisture Surges and Precipitation in the Southwestern United States, R.W. Higgins, W. Shi and C. Hain, Climate Prediction Center, NOAA/NWS/NCEP February 2004 (Journal of Climate – in Press) https://www.eol.ucar.edu/projects/name/documentation/hsh04.pdf

II.3 Event Day Summary

The exceptional event on September 19, 2016 caused by the movement of a low-pressure trough off the coast of Northern Baja and from moisture streaming north form Hurricane Paine located west of Southern Baja. Essentially, the low-pressure system off the Southern California coast drew mid-level moisture from Hurricane Paine into Southern California causing early morning scattered showers and isolated thunderstorms with dry lightning.[9]

On September 19, 2016, a weak high pressure over the Rio Grande Valley influenced Hurricane Paine, located west of Baja California and a cutoff low-pressure system, located southwest of San Diego. The low pressures were steered towards the north with the southerly flow over Baja California. This allowed the intrusion of moisture into San Diego County, Riverside County, Imperial County and Yuma County. Dense cloud cover moved over Imperial and Yuma counties with virga falling into the dry layer creating strong wind gusts transporting areas of dust within the mountains and passes of San Diego County, northern Baja California. The windblown dust blew into and over natural open deserts, farmlands and populated areas in Imperial County, affecting air quality and causing an exceedance at the Westmorland monitor.[10]

Figures 2-19 through 2-24 provide information regarding the existing meteorological conditions, low-pressure systems, Hurricane Paine and southerly winds, that allowed moisture to enter the desert southwest causing virga to create strong wind gusts transporting dust into Imperial County.

[9] Area Forecast Discussion, National Weather Service San Diego CA, 251 AM PST (351 AM PDT) Monday, September 19, 2016
[10] According to the National Weather Service, virga is defined as streaks or wisps of precipitation falling from a cloud but evaporating before reaching the ground. In certain cases, shafts of virga may precede a microburst.

FIGURE 2-19
UPPER LEVEL LOW AND HURRICANE PAINE

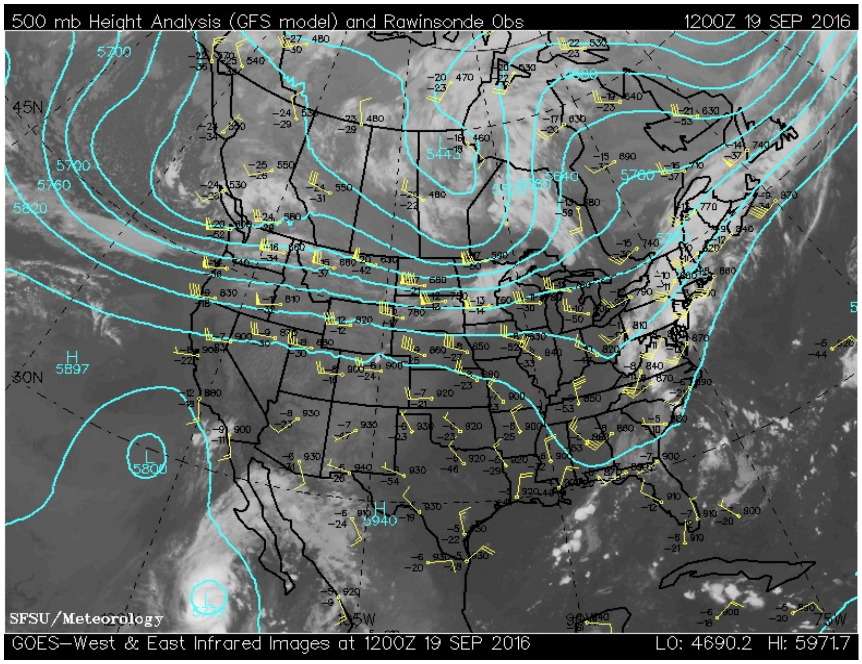

Fig 2-19: While Hurricane Paine moved north an upper level low off of the southern California coast helped channel the moist air into southeast California. Source: SFSU Department of Earth and Climate Sciences and the California Regional Weather Server; http://squall.sfsu.edu/crws/archive/sathts_arch.html

FIGURE 2-20
HURRICANE PAINE SEPTEMBER 19, 2016

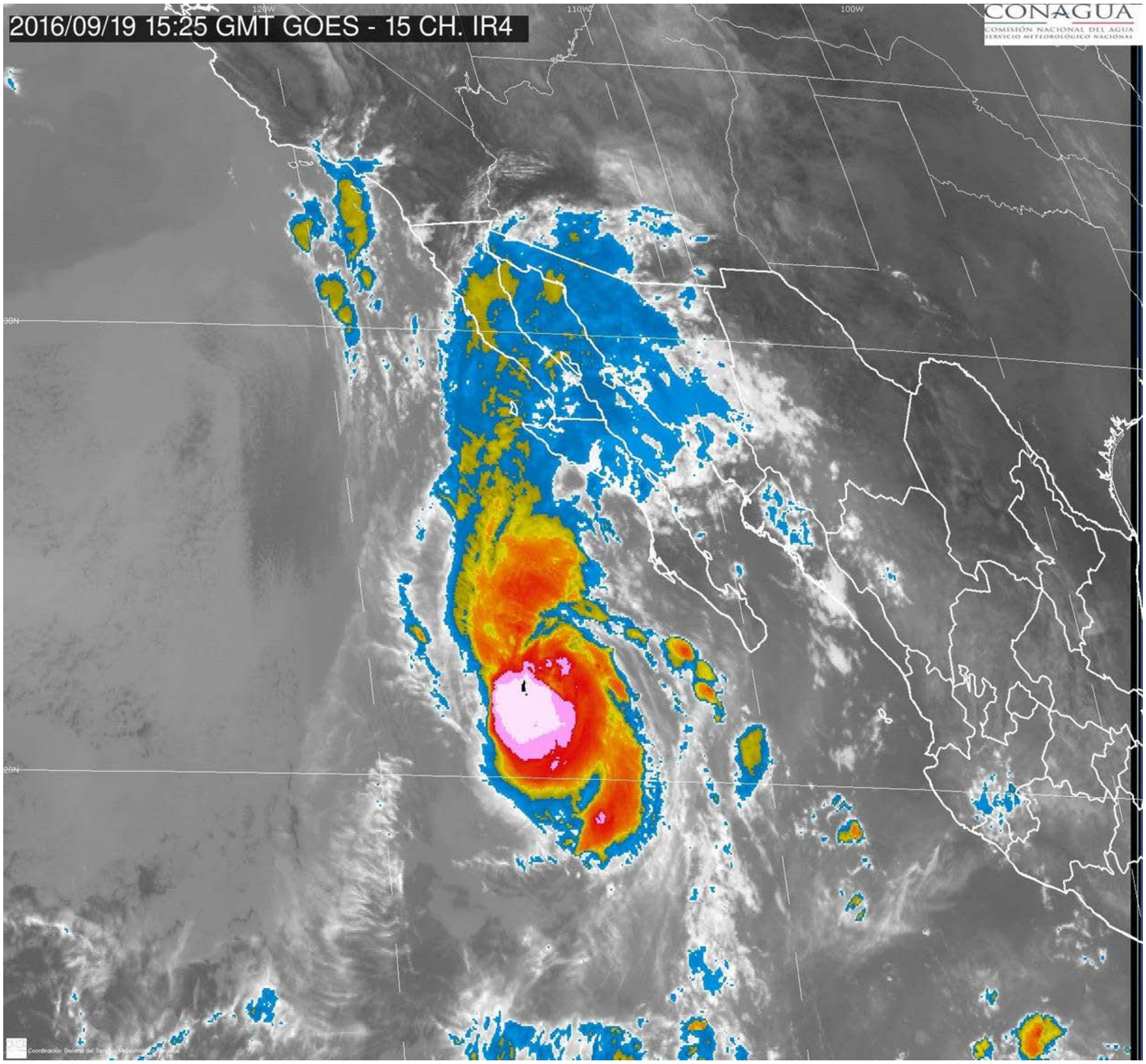

Fig 2-20: The satellite image demonstrated the movement of Hurricane Paine northward along Baja California. The satellite image similarly demonstrates the intrusion of moisture into San Diego and Imperial counties. Source: CONAGUA the National Water Commission article identifying a surveillance zone for the western portion of Baja California https://www.gob.mx/conagua/prensa/se-activo-zona-de-vigilancia-por-vientos-de-tormenta-tropical-en-la-porcion-occidental-de-la-peninsula-de-baja-california-por-paine

FIGURE 2-21
HURRICANE PAINE OFF BAJA CALIFORNIA

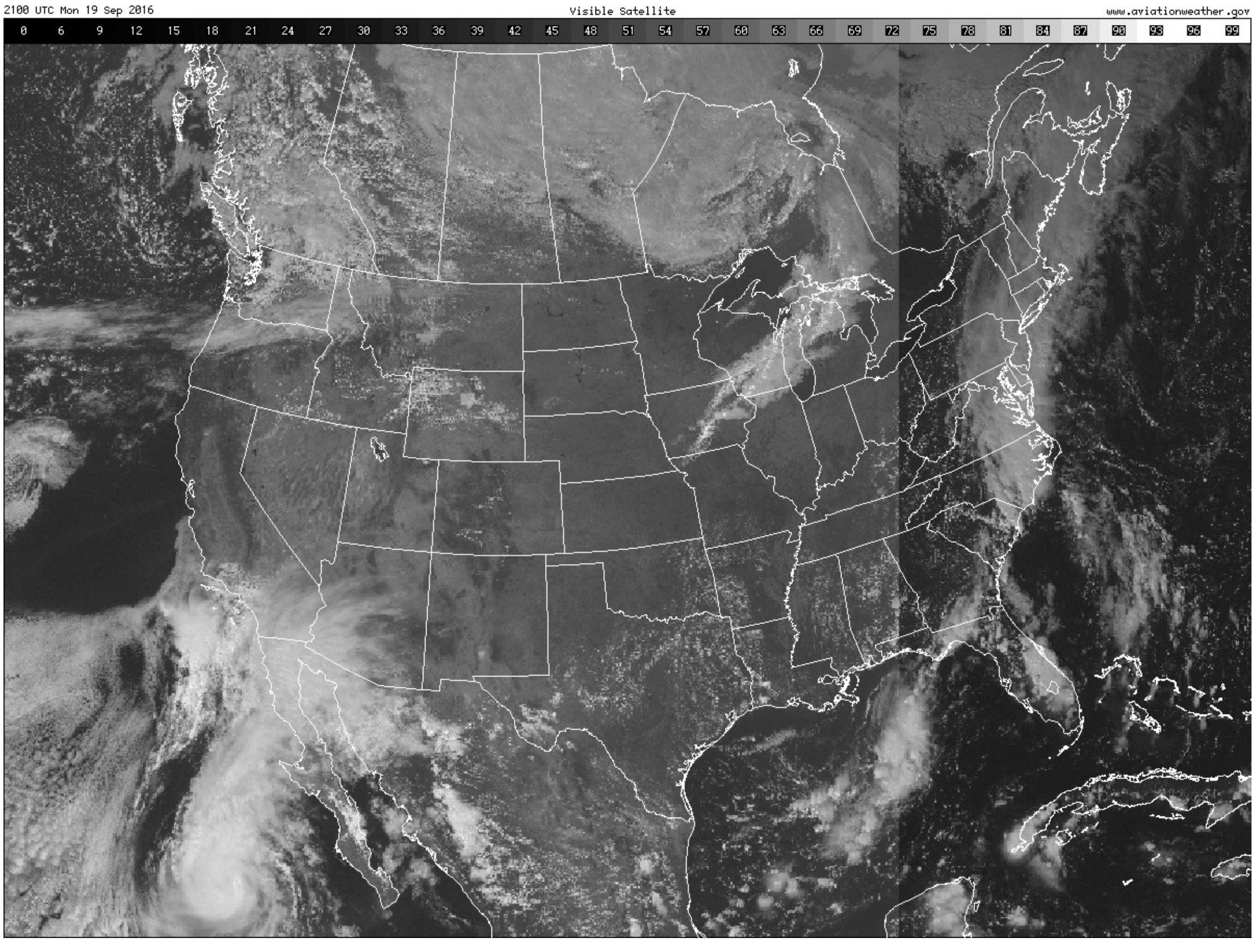

Fig 2-21: A visible satellite image (1300 PST) shows Hurricane Paine off the western coast of Baja California. A good amount of moisture-bearing clouds extends into southeast California and southwest Arizona. Source: Aviationweather.gov from http://www.mmm.ucar.edu/imagearchive

FIGURE 2-22
HURRICANE PAINE BRINGS MOIST UNSTABLE AIR TO SOUTHEAST CALIFORNIA

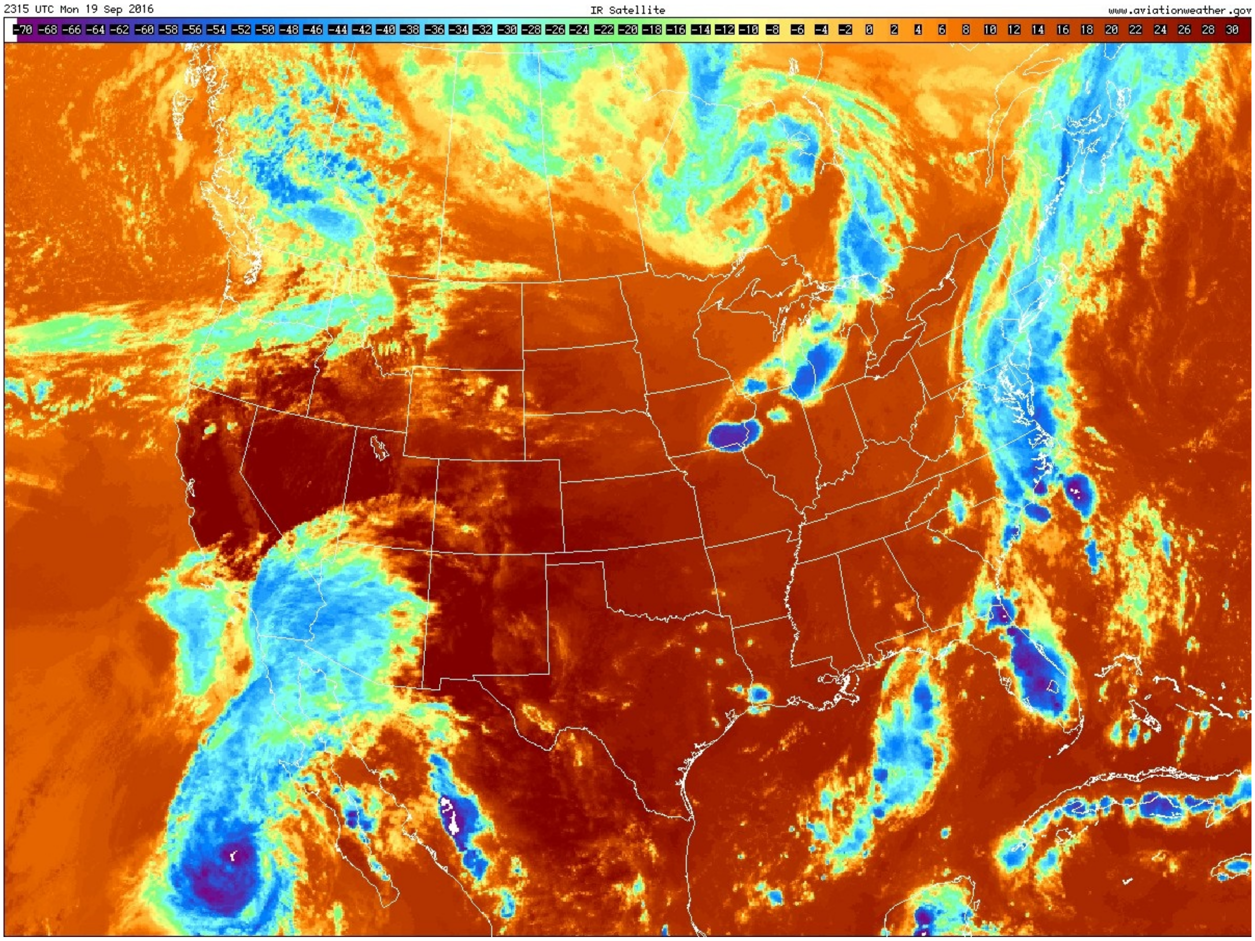

Fig 2-22: An infrared satellite image (1515 PST) shows Hurricane Paine off the western coast of Baja California. A good amount of moisture-bearing clouds extends into southeast California and southwest Arizona. The midlevel moisture along with dry air near the surface promoted conditions ideal for convection and thunderstorms. Source: Aviationweather.gov from http://www.mmm.ucar.edu/imagearchive

FIGURE 2-23
HURRICANE PAINE TRACKS TOWARD SOUTHEAST CALIFORNIA

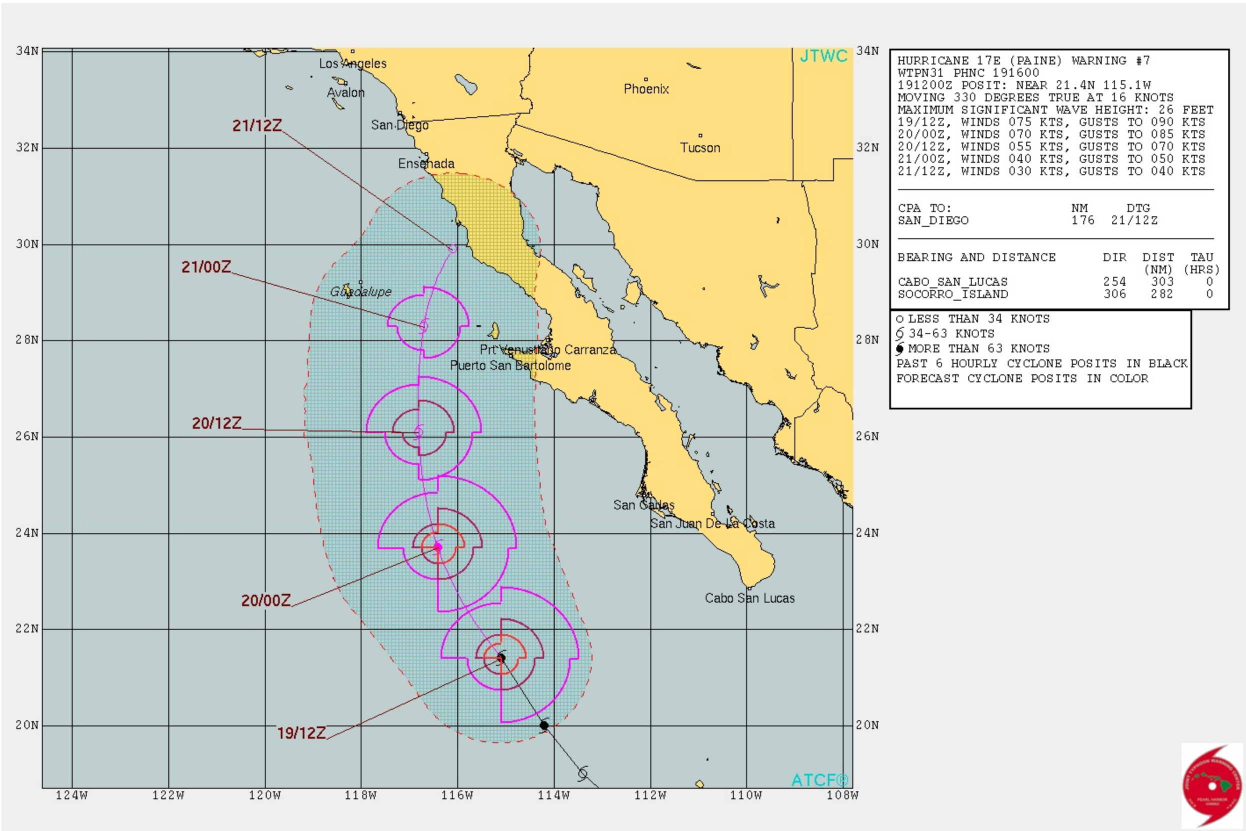

Fig 2-23: Hurricane Paine moved north and then northeast. This pushed a surge of moist unstable air over southeast California and southwest Arizona. Source: Automated Tropical Cyclone Forecasting System; https://www.nrlmry.navy.mil/atcf_web

FIGURE 2-24
SOUTHERLY WINDS OVER SOUTHEASTERN CALIFORNIA

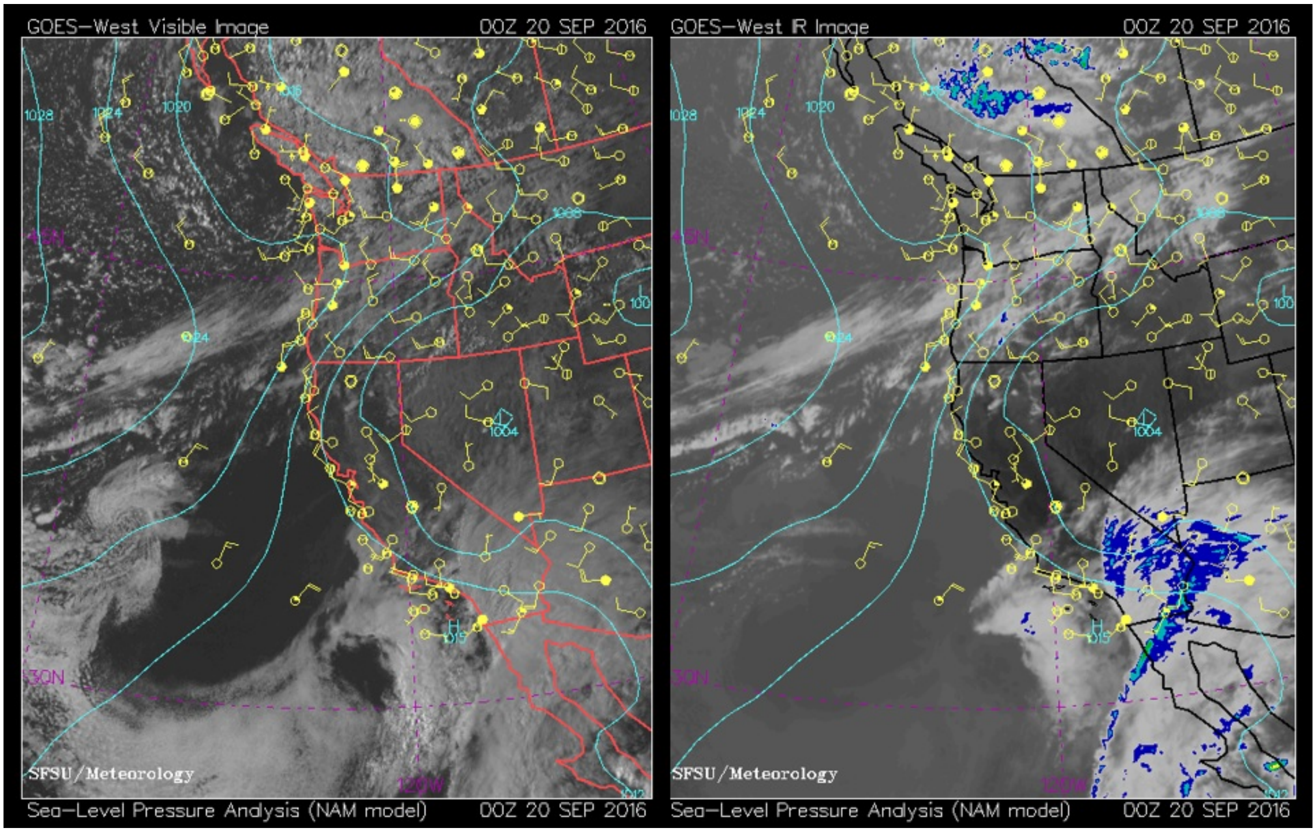

Fig 2-24: GOES-W visible (left) and infrared (right) images at 1600 PST. The presence of Hurricane Paine to the south generated gusty southerly winds across southeast California as indicated by the wind barbs. The right image shows moderately intense storm cells drifting across the region. Although Source: SFSU Department of Earth and Climate Sciences and the California Regional Weather Server; http://squall.sfsu.edu/crws/archive/sathts_arch.html

The San Diego NWS office identified a line of showers and thunderstorms that rumbled across San Diego County between 200 and 400 am with 15 recorded lightning strikes over coastal San Diego and adjacent coastal waters.[11] The Area Forecast Discussion explained that moisture surged northward the prior evening in the southerly flow ahead of the closed upper low off the coast of Northern Baja. While deeper moisture from Hurricane Paine moved into Southern California, Hurricane Paine weakened to a Tropical Storm as it continued to move north-northwest approaching central Baja. This put the mountains and lower deserts on the western edge of the deep moisture.

The Phoenix NWS office confirmed the effects of the moisture from the remnants of Hurricane Paine. The Phoenix NWS office identified substantial spreading of outflow from the storm with

[11] Area Forecast Discussion, National Weather Service San Diego CA, 825 AM PST (925 AM PDT) Monday, September 19, 2016

high cloudiness into southeast California and southwest Arizona.[12] As a result, the Phoenix NWS office adjusted it afternoon forecast to include an earlier timing of precipitation into Imperial and Yuma counties. In addition, the Phoenix NWS office confirmed the presence of the large cutoff low centered west of San Diego and its potential to cyclonically circulate a significant amount of tropical moisture into southeast California and southwest Arizona during the evening hours and into Tuesday, September 20, 2016.

By the afternoon hours, the San Diego NWS office released forecast discussion identifying streaming clouds moving north ahead of the low-pressure trough off the coast of Northern Baja and from the moisture streaming north from Hurricane Paine located west of Baja.[13] Confirmation of the move north was similarly supported by the afternoon discussions released by Phoenix NWS office. The Phoenix NWS office discussed the estimated onset of rain in Imperial and Yuma Counties by late Monday afternoon with lightning activity within northeast Sonora and a few strikes in the northern Gulf of California.[14] In response to the moving system, the Phoenix NWS office updated its forecast to include moderate to strong southerly surface winds with local gusts 27 to 34 mph producing local blowing dust, which prompted an Urgent Weather Message for blowing dust. Both NWS offices confirmed the strong wind gusts over the lower deserts.[15] The Phoenix NWS office published a Public Information Statement identifying top wind speeds in Riverside, Imperial and Yuma counties. Top winds in Riverside measured 38 mph, in Imperial 49 mph and in Yuma 32 mph.[16]

Locally, all airports including the Yuma MCAS (KNYL) and the Mexicali International Airport all measured elevated winds and gusts. At the Imperial County Airport (KIPL) and El Centro NAF (KNJK), winds were light until midafternoon when winds and gusts from the south elevate. Measured peak winds at Imperial County Airport (KIPL) reached 34 mph while measured peak gusts were 44 mph. The airport measured one hour of winds above the 25 mph threshold, while the El Centro NAF (KNJK) measured two hours of winds above 25 mph. upstream wind sites in Yuma, Arizona, and several locations in Mexico measured strong winds and/or gusts. **Figure 2-25** depicts the ramp-up analysis for September 19, 2016 providing a visual depiction of the meteorological conditions that existed when virga falling into the dry layer created strong wind gusts during the afternoon hours transporting and suspending fugitive dust and affecting all the air monitors in Imperial County. All the air monitors in Imperial County, except for the Brawley monitor, measured elevated concentrations above 100 µg/m^3. Brawley measured 99 µg/m^3.

[12] Area Forecast Discussion, National Weather Service Phoenix AZ, 1020 AM PST (1120 AM MST) Monday September 19, 2016
[13] Area Forecast Discussion, National Weather Service San Diego CA, 1245 PM PST (145 PM PDT) Monday, September 19, 2016
[14] Area Forecast Discussion, National Weather Service Phoenix AZ, 116 PM PST (216 PM MST) Monday, September 19, 2016
[15] Area Forecast Discussion, National Weather Service San Diego CA, 808 PM PST (908 PM PDT), Monday, September 19, 2016
[16] Public Information Statement, National Weather Service Phoenix AZ, 743 PMPST (843 PM MST), Monday, September 19,2016

FIGURE 2-25
RAMP-UP ANALYSIS SEPTEMBER 19, 2016

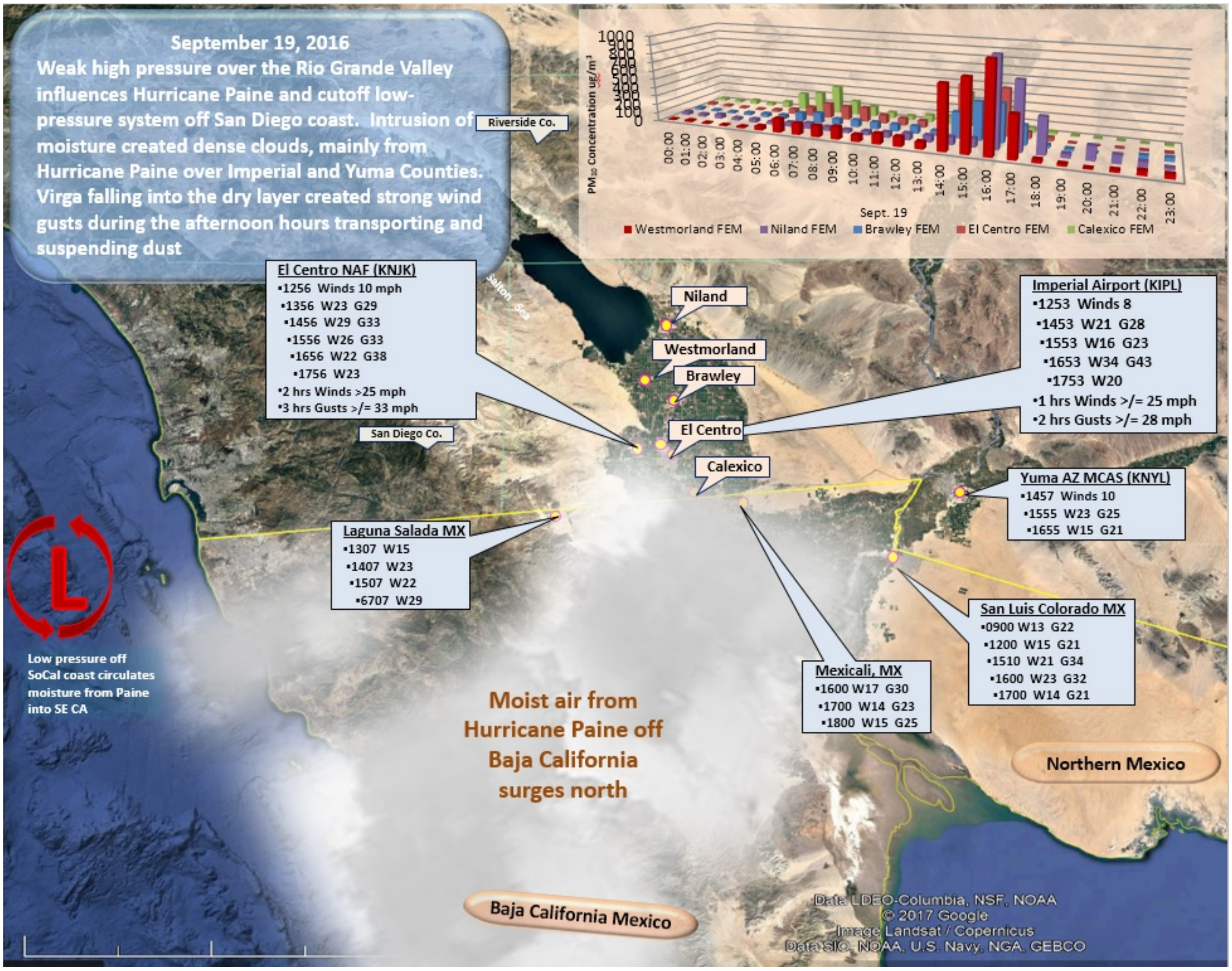

Fig 2-25: Moist tropical air surging north from Hurricane Paine was circulated into southeast California by an upper level low located off the southern California coast. Google Earth base map

Table 2-2 contains a summary of maximum winds, peak wind gusts, and wind direction at monitors in Imperial County, eastern Riverside County, Yuma County, Arizona, and Mexicali. For detailed meteorological station, graphs see **Appendix B**.

TABLE 2-2
WIND SPEEDS ON SEPTEMBER 19, 2016

Station Monitor Airport Meteorological Data	Maximum Wind Speed (WS) (mph)	Wind Direction during Max WS (degrees)	*Time of Max Wind Speed	24 hr Maximum Wind Gust (WG) (mph)	Time of Max WG	PM10 correlated to time of Max Wind Speed Brly	CX	EC	Nlnd	Wstmld
IMPERIAL COUNTY										
Imperial Airport (KIPL)	34	190	16:53	44	16:53	435	264	536	995	995
Naval Air Facility (KNJK)	29	180	14:46	38	16:56	291	395	544	87	716
Calexico (Ethel St)	-	-	-	-	-	-	-	-	-	
El Centro (9th Street)	14	236	17:00	-	-	221	53	73	755	470
Niland (English Rd)	25	201	17:00	-	-	221	53	73	755	470
Westmorland	16	194	16:00	-	-	435	264	536	995	995
RIVERSIDE COUNTY										
Blythe Airport (KBLH)	22	350	10:52			80	68	97	47	78
Palm Springs Airport (KPSP)	17	110	11:53			80	49	81	60	117
Jacqueline Cochran Regional Airport (KTRM) - Thermal	20	150	18:03	29	18:03	36	29	39	402	39
ARIZONA - YUMA										
Yuma MCAS (KNYL)	23	250	15:55	25	15:48	429	807	286	98	800
MEXICALI - MEXICO										
Mexicali Int. Airport (MXL)	18	180	15:47			429	807	286	98	800

*All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted
The Calexico monitoring station did not have an operating meteorological station on September 19, 2016

The National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory HYSPLIT back trajectory model,[17] depicted in **Figure 2-24** depicts the general path of air as it approached Westmorland on September 19, 2016. The six-hour back trajectory ends at 1600 PST during the hour of measured peak concentration. The air parcel has a distinct southerly flow, coincident with the accounts described by both the San Diego and Phoenix NWS offices. Based on the predominant airflow, windblown dust from the south into Imperial County affected air quality and caused an exceedance of the NAAQS at the Westmorland monitor on September 19, 2016. Data used in the HYSPLIT model has a horizontal resolution of 12 km and is integrated every three hours. Thus, the HYSPLIT model can differ from local observed surface wind speeds and directions.

[17] The Hybrid Single Particle Lagrangian Integrated Trajectory Model (**HYSPLIT**) is a computer model that is a complete system for computing simple air parcel trajectories to complex dispersion and deposition simulations. It is currently used to compute air parcel trajectories and dispersion or deposition of atmospheric pollutants. One popular use of HYSPLIT is to establish whether high levels of air pollution at one location are caused by transport of air contaminants from another location. HYSPLIT's back trajectories, combined with satellite images (for example, from NASA's MODIS satellites), can provide insight into whether high air pollution levels are caused by local air pollution sources or whether an air pollution problem was blown in on the wind The initial development was a result of a joint effort between NOAA and Australia's Bureau of Meteorology. Source: NOAA/Air Resources Laboratory, 2011.

FIGURE 2-26
HYSPLIT BACK-TRAJECTORY MODELS

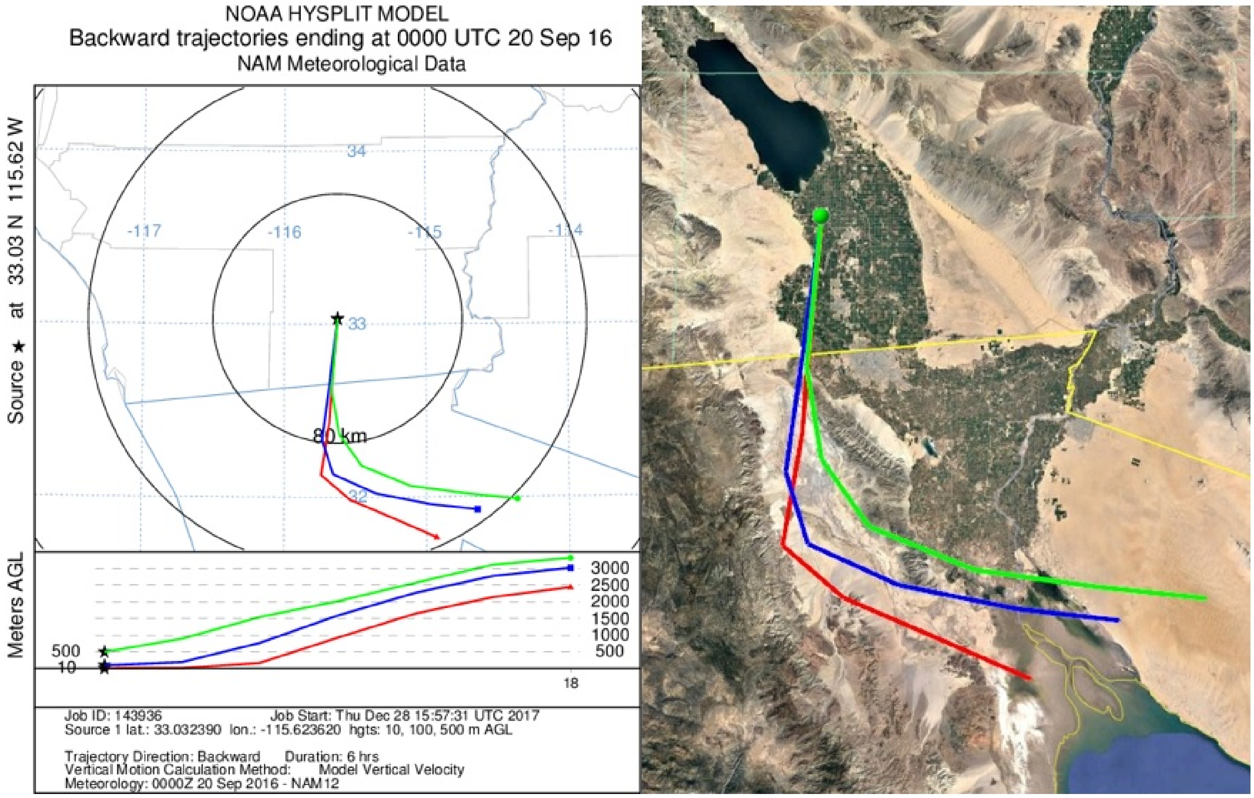

Fig 2-26: A six-hour back-trajectory ending at Westmorland at 1600 PST on September 19, 2016 illustrates the predominant direction of the airflow over open natural deserts in Mexico before reaching the monitor. Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100 m; green indicates airflow at 500m. Yellow line indicates the international border. Aqua lines denote county boundaries. Dynamically generated through NOAA's Air Resources Laboratory HYSPLIT model. Base map from Google Earth

Figures 2-27 and 2-28 illustrate the elevated wind speeds and elevated levels of hourly PM_{10} concentrations measured in Riverside, Imperial and Yuma counties for three days, September 18, 2016 through September 20, 2016. Elevated dust emissions were transported into Imperial County affecting air monitors during the afternoon hours when virga caused gusty southerly winds. The air monitors in Imperial County, measured the highest measured elevated concentrations 1300 through 1800 on September 19, 2016 coincident with measured wind speeds and gusts above 25mph.

The resulting entrained dust and accompanying high winds from the system qualify this event as a "high wind dust event".[18] High wind dust events are considered natural events where the

[18] Title 40 Code of Federal Regulations part 50: §50.1(p) High wind dust event is an event that includes the high-speed wind and the dust that the wind entrains and transports to a monitoring site.

windblown dust is either from solely a natural source or from areas where anthropogenic sources of windblown dust are controlled with Best Available Control Measures (BACM). The following sections provide evidence that the September 19, 2016 high wind event qualifies as a natural event and that BACM was overwhelmed by the suddenness and intensity of the meteorological event

FIGURE 2-27
72-HOUR WIND SPEEDS AT REGIONAL AIRFIELDS

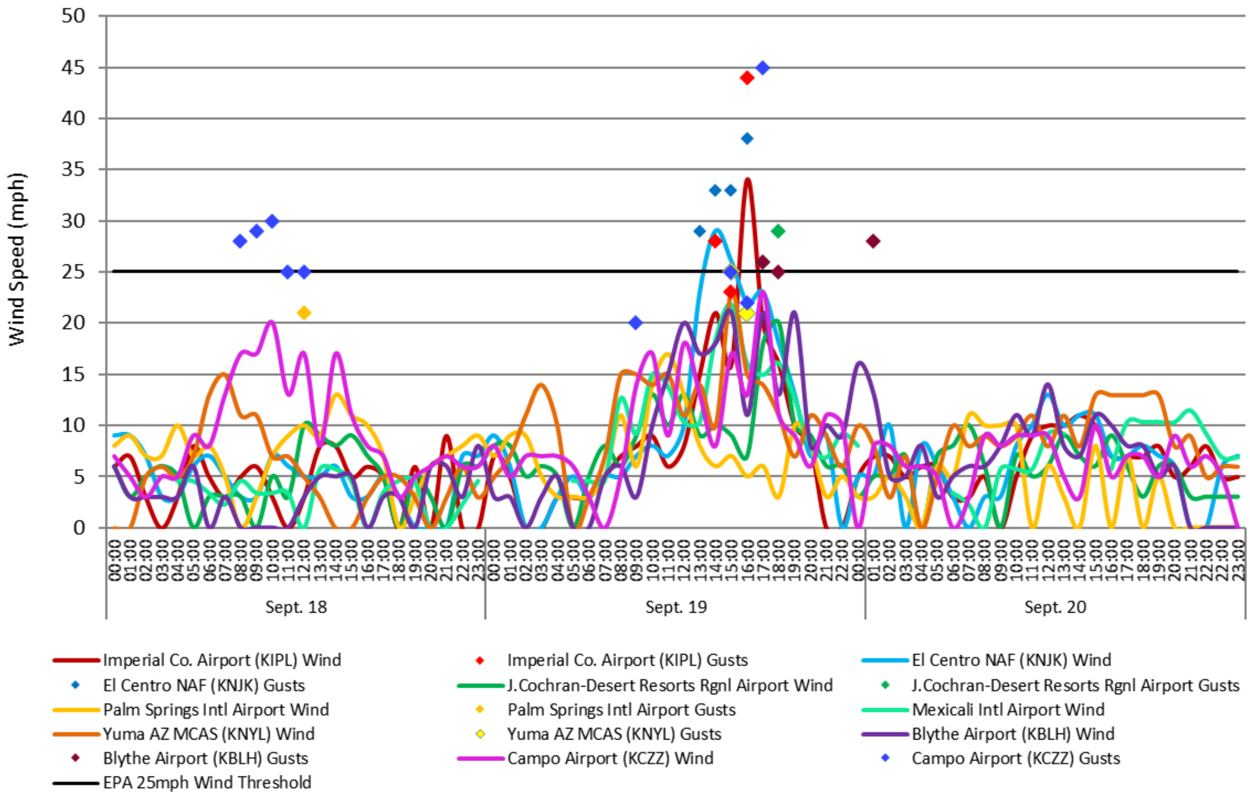

Fig 2-27: Is the graphical representation of the 72-hour measured winds speeds and gusts at regional airfields in southeast California and southwestern Arizona. The graph illustrates the significant number of hours where measured wind speeds and wind gusts where above 25 mph. The graph helps to substantiate the regional nature of the event. Wind Data from the NCEI's QCLCD system

FIGURE 2-28
72-HOUR PM_{10} CONCENTRATIONS AT VARIOUS SITES

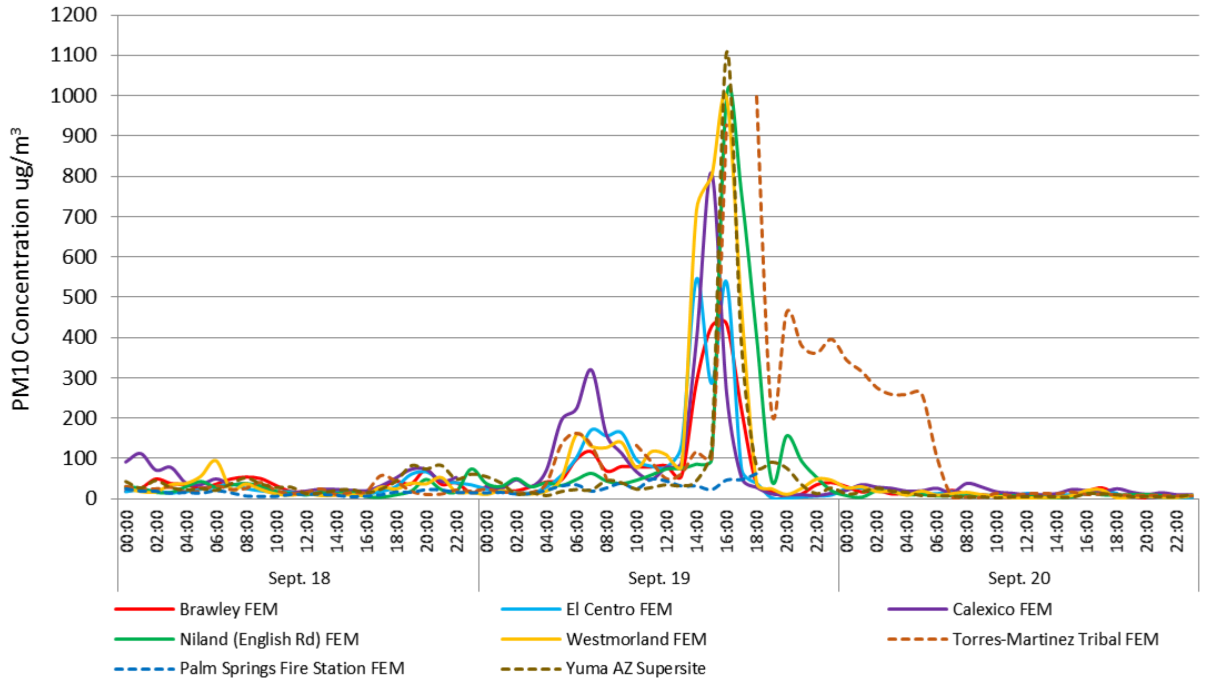

Fig 2-28: Is the graphical representation of the 72-hour relative PM_{10} concentrations at various sites in southeast California and southwestern Arizona. The elevated PM_{10} concentrations at all sites on September 19, 2016 help demonstrate the regional effect of the weather system and accompanying winds. Indio (Jackson St) was coded "AN" during this period. Air quality data from the EPA's AQS data bank

VI Historical Concentrations

III.1 Analysis

While naturally occurring high wind events may recur seasonally and at times frequently and qualify for exclusion under the EER, historical comparisons of the particulate concentrations and associated winds provide insight into the frequency of events within an identified area. The following time series plots illustrate that PM_{10} concentrations measured at the Westmorland monitor on September 19, 2016, was compared to non-event and event days demonstrating the variability over several years and seasons. The analysis, also, provides supporting evidence that there exists a clear causal relationship between the September 19, 2016 high wind event and the exceedance measured at the Westmorland monitor.

Figures 3-1 through 3-2 show the time series of available FRM and BAM 24-hr PM_{10} concentrations at the Westmorland station for the period of January 1, 2010 through September 19, 2016. Note that prior to 2013, the BAM data was not considered FEM and was not reported into AQS.[19] In order to properly establish the variability of the event as it occurred on September 19, 2016, 24-hour averaged PM_{10} concentrations between January 1, 2010 and September 19, 2016 were compiled and plotted as a time series. All figures illustrate that the exceedance, which occurred on September 19, 2016 were outside the normal historical concentrations when compared to event and non-event days. Air quality data for all graphs was obtained through the EPA's AQS data bank.

[19] Pollutant concentration data contained in EPA's Air Quality System (AQS) are required to be reported in units corrected to standard temperature and pressure (25 C, 760 mm Hg). Because the PM_{10} concentrations prior to 2013 were not reported into the AQS database all BAM (FEM) data prior to 2013 within this report are expressed as micrograms per cubic meter (mg/m3) at local temperature and pressure (LTP) as opposed to standard temperature and pressure (STP, 760 torr and 25 C). The difference in concentration measurements between standard conditions and local conditions is insignificant and does not alter or cause any significant changes in conclusions to comparisons of PM_{10} concentrations to PM_{10} concentrations with in this demonstration.

FIGURE 3-1
WESTMORLAND FRM AND FEM PM_{10} 24-HR AVG
HISTORICAL CONCENTRATIONS
JANUARY 1, 2010 TO SEPTEMBER 19, 2016

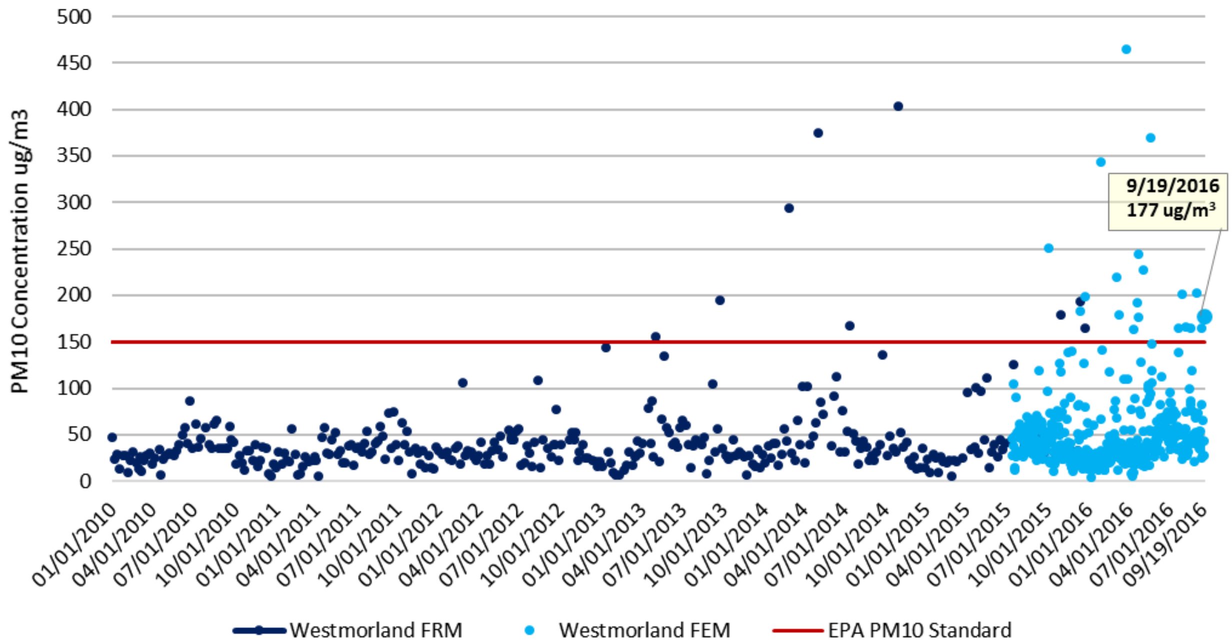

Fig. 3-1: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 177 µg/m^3 on September 19 by the Brawley FRM PM_{10} monitor was outside the normal historical measurements. The far vast number of samples fall way below the exceedance threshold

The time series, **Figures 3-1,** for Westmorland included (2,454 using every calendar day) (782 using Westmorland scheduled sampling days per workbook) sampling days (January 1, 2010 through September 19, 2016). During this period the Westmorland station (**Figure 3-1**) recorded 789 credible samples measured by either FRM or FEM monitors between January 1, 2010 and September 19, 2016.[20] Overall, the time series illustrates that of the 789 credible samples measured during there was a total of 27 exceedance days, which is a 3.4% occurrence rate. Clearly, exceedances by the Westmorland monitoring station over a historical period is a rare event.

[20] Westmorland FEM sampling commenced July 2015.

FIGURE 3-2
WESTMORLAND SEASONAL COMPARISON
PM_{10} 24-HR AVG CONCENTRATIONS
JULY THROUGH SEPTEMBER, 2010 TO (SEPTEMBER 19) 2016

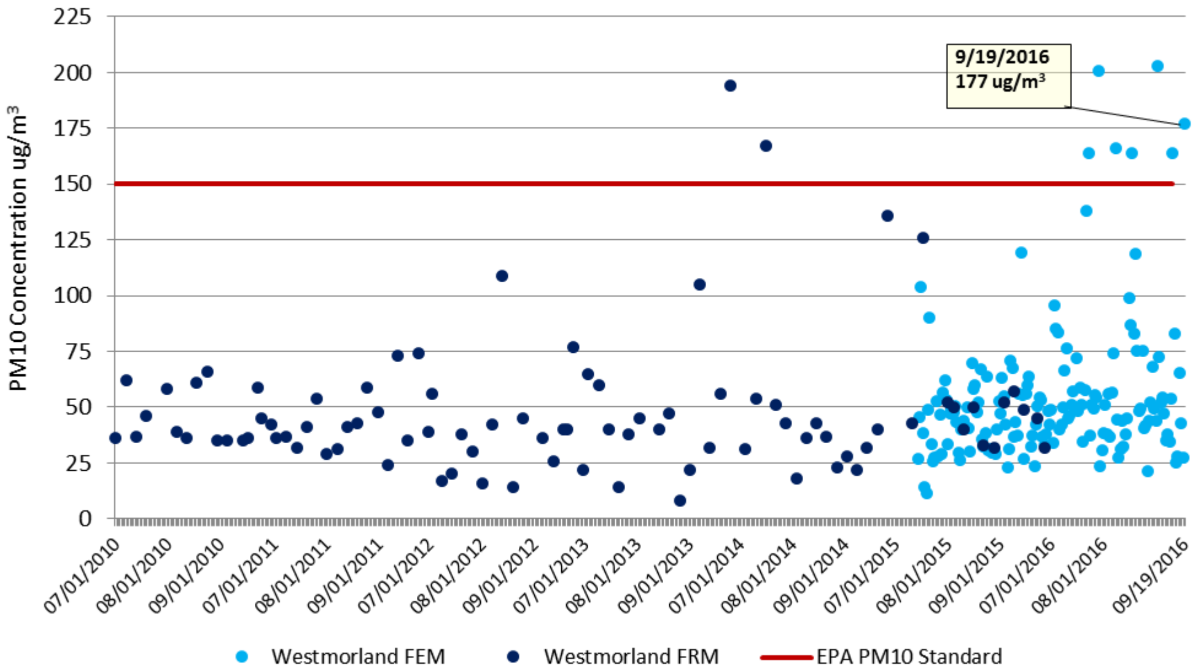

Fig. 3-6: A comparison of PM_{10} historical concentrations demonstrates that the measured concentrations of 177 μg/m^3 on September 19, 2016 by the Westmorland BAM 1020 PM_{10} monitor were outside the normal historical measurements. The far vast number of samples fall way below the exceedance threshold.

Figures 3-4 through 3-6 display the seasonal fluctuations over 623 using every calendar day // 249 (using Westmorland scheduled sampling days per workbook) sampling days at the Westmorland stations for months July through September of years 2010 through 2016 (2016 ending September 19). The seasonal sampling period for Westmorland (**Figure 3-2**) contains 249 combined FRM and FEM samples. Of these, nine exceedances occurred during the third quarter which translates into 3.6% of all samples. Clearly, exceedances by the Westmorland monitoring station over a historical seasonal period is a rare event.

Figure 3-3 displays percentile rankings for Westmorland over the historical period of January 2010 through September 19, 2016.

FIGURE 3-3
WESTMORLAND HISTORICAL
PM_{10} 24 HR FRM & FEM CONCENTRATIONS
JANUARY 2010 THROUGH SEPTEMBER 19, 2016

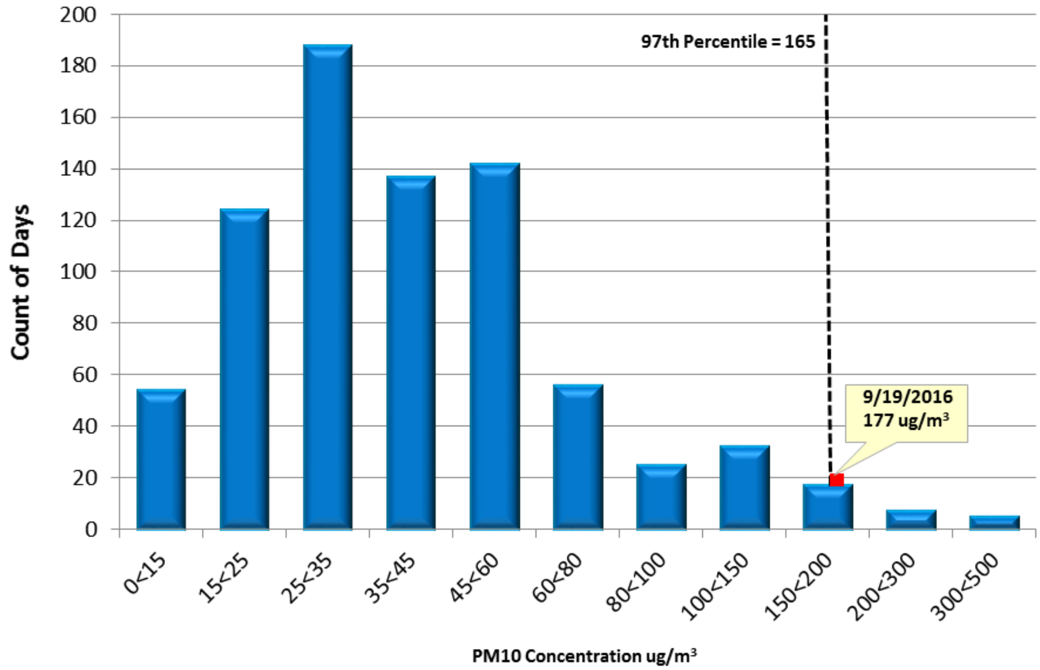

Fig 3-3: The 24-hr average PM_{10} concentration at the Westmorland monitoring site demonstrates that the concentration of 177 µg/m^3 on September 19, 2016 fell on the 98th percentile.

For the combined FRM and FEM data sets the annual historical and the seasonal historical PM_{10} concentrations of 177 µg/m^3 at Westmorland was in excess of the 97th percentile. Looking at the annual time series concentrations, the seasonal time series concentrations, and the percentile rankings for the historical patterns, the September 19, 2016 measured exceedances are clearly outside the normal concentration levels when comparing to non-event days and event days.

III.2 Summary

The information provided, above, by the time series plots, seasonal time series plots, and the percentile rankings illustrate that the PM_{10} concentration observed on September 19, 2016 occurs infrequently. When comparing the measured PM_{10} levels on September 19, 2016 and following USEPA EER guidance, this demonstration provides supporting evidence that the measured exceedances measured at the Westmorland monitoring site was outside the normal historical and seasonal historical concentration levels.

The historical concentration analysis provided here supports the determination that the September 19, 2016 natural event affected the concentrations levels at the Westmorland monitors causing an exceedance. The concentration analysis further supports that the natural event affected air quality in such a way that there exists a clear causal relationship between the measured exceedances on September 19, 2016 and the natural event, qualifying the natural event as an Exceptional Event.

VI Not Reasonably Controllable or Preventable

According to the October 3, 2016 promulgated revision to the Exceptional Event (EE) rule under 40 CFR §50.14(b)(8) air agencies must address the "not reasonably controllable or preventable" (nRCP) criterion as two prongs. In order to properly address the nRCP criterion the ICAPCD must not only identify the natural and anthropogenic sources of emissions causing and contributing to the monitored exceedance but must identify the relevant State Implementation Plan (SIP) measures and/or other enforceable control measures in place for the identified sources. An effective analysis of the nRCP must include the implementation status of the control measures in order to properly consider the measures as enforceable. USEPA considers control measures to be enforceable if approved into the SIP within 5 years of an EE demonstration submittal. The identified control measures must address those specific sources that are identified as causing or contributing to a monitored exceedance.

The final EE rule revision explains that an event is considered not reasonably controllable if reasonable measures to control the impact of the event on air quality were applied at the time of the event. Similarly, an event is considered not reasonably preventable if reasonable measures to prevent the event were applied at the time of the event. However, for "high wind events" when PM_{10} concentrations are due to dust raised by high winds from desert areas whose sources are controlled with Best Available Control Measures (BACM) then the event is a "natural event" where human activity plays little or no direct causal role and thus is considered not preventable.

This section begins by providing background information on all SIP and other enforceable control measures in force during the EE for September 19, 2016. In addition, this September 19, 2016, demonstration provides technical and non-technical evidence that strong and gusty southerly winds blew across portions of the Sonoran Desert within Mexico to the south and into Imperial County suspending particulate matter affecting the Westmorland monitor on September 19, 2016. This section identifies all natural and anthropogenic sources and provides regulatory evidence of the enforceability of the control measures in place during the September 19, 2016 EE.

IV.1 Background

Inhalable particulate matter (PM_{10}) contributes to effects that are harmful to human health and the environment, including premature mortality, aggravation of respiratory and cardiovascular disease, decreased lung function, visibility impairment, and damage to vegetation and ecosystems. Upon enactment of the 1990 Clean Air Act (CAA) amendments, Imperial County was classified as moderate nonattainment for the PM_{10} NAAQS under CAA sections 107(d)(4)(B) and 188(a). By November 15, 1991, such areas were required to develop and submit State Implementation Plan (SIP) revisions providing for, among other things, implementation of reasonably available control measures (RACM).

Partly to address the RACM requirement, ICAPCD adopted local Regulation VIII rules to control PM_{10} from sources of fugitive dust on October 10, 1994, and revised them on November 25, 1996. USEPA did not act on these versions of the rules with respect to the federally enforceable SIP.

On August 11, 2004, USEPA reclassified Imperial County as a serious nonattainment area for PM_{10}. As a result, CAA section 189(b)(1)(B) required all BACM to be implemented in the area within four years of the effective date of the reclassification, i.e., by September 10, 2008.

On November 8, 2005, partly to address the BACM requirement, ICAPCD revised the Regulation VIII rules to strengthen fugitive dust requirements. On July 8, 2010, USEPA finalized a limited approval of the 2005 version of Regulation VIII, finding that the seven Regulation VIII rules largely fulfilled the relevant CAA requirements. Simultaneously, USEPA also finalized a limited disapproval of several of the rules, identifying specific deficiencies that needed to be addressed to fully demonstrate compliance with CAA requirements regarding BACM and enforceability.

In September 2010, ICAPCD and the California Department of Parks and Recreation (DPR) filed petitions with the Ninth Circuit Federal Court of Appeals for review of USEPA's limited disapproval of the rules. After hearing oral argument on February 15, 2012, the Ninth Circuit directed the parties to consider mediation before rendering a decision on the litigation. On July 27, 2012, ICAPCD, DPR and USEPA reached agreement on a resolution to the dispute which included a set of specific revisions to Regulation VIII. These revisions are reflected in the version of Regulation VIII adopted by ICAPCD on October 16, 2012 and approved by USEPA April 22, 2013. Since 2006 ICAPCD had implemented regulatory measures to control emissions from fugitive dust sources and open burning in Imperial County.

FIGURE 4-1
REGULATION VIII GRAPHIC TIMELINE DEVELOPMENT

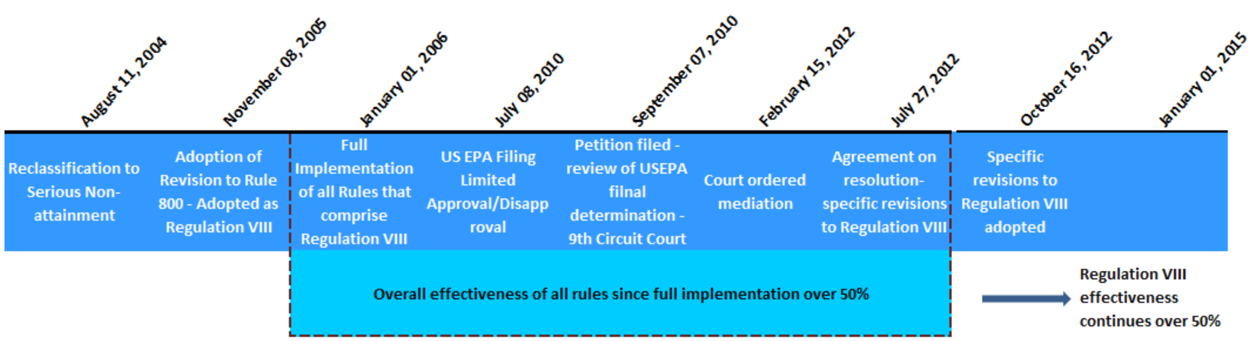

Fig 4-1: Regulation VIII Graphic Timeline

IV.1.a Control Measures

Below is a brief summary of Regulation VIII, which is comprised of seven fugitive dust rules. **Appendix D** contains a complete set of the Regulation VIII rules.

ICAPCD's Regulation VIII consists of seven interrelated rules designed to limit emissions of PM_{10} from anthropogenic fugitive dust sources in Imperial County.

Rule 800, General Requirements for Control of Fine Particulate Matter, provides definitions, a compliance schedule, exemptions and other requirements generally applicable to all seven rules. It requires the United States Bureau of Land Management (BLM), United States Border Patrol (BP) and DPR to submit dust control plans (DCP) to mitigate fugitive dust from areas and/or activities under their control. Appendices A and B within Rule 800 describe methods for determining compliance with opacity and surface stabilization requirements in Rules 801 through 806.

Rule 801, Construction and Earthmoving Activities, establishes a 20% opacity limit and control requirements for construction and earthmoving activities. Affected sources must submit a DCP and comply with other portions of Regulation VIII regarding bulk materials, carry-out and track-out, and paved and unpaved roads. The rule exempts single family homes and waives the 20% opacity limit in winds over 25 mph under certain conditions.

Rule 802, Bulk Materials, establishes a 20% opacity limit and other requirements to control dust from bulk material handling, storage, transport and hauling.

Rule 803, Carry-Out and Track-Out, establishes requirements to prevent and clean-up mud and dirt transported onto paved roads from unpaved roads and areas.

Rule 804, Open Areas, establishes a 20% opacity limit and requires land owners to prevent vehicular trespass and stabilize disturbed soil on open areas larger than 0.5 acres in urban areas, and larger than three acres in rural areas. Agricultural operations are exempted.

Rule 805, Paved and Unpaved Roads, establishes a 20% opacity limit and control requirements for unpaved haul and access roads, canal roads and traffic areas that meet certain size or traffic thresholds. It also prohibits construction of new unpaved roads in certain circumstances. Single-family residences and agricultural operations are exempted.

Rule 806, Conservation Management Practices, requires agricultural operation sites greater than 40 acres to implement at least one conservation management practice (CMP) for each of several activities that often generates dust at agricultural operations. In addition, agricultural operation sites must prepare a CMP plan describing how they comply with Rule 806, and must make the CMP plan available to the ICAPCD upon request.

IV.1.b Additional Measures

Imperial County Natural Events Action Plan (NEAP)

On August 2005, the ICAPCD adopted a NEAP for the Imperial County, as was required under the former USEPA Natural Events Policy, to address PM_{10} events by:

- Protecting public health;
- Educating the public about high wind events;
- Mitigating health impacts on the community during future events; and
- Identifying and implementing BACM measures for anthropogenic sources of windblown dust.

Smoke Management Plan (SMP) Summary

There are 35 Air Pollution Control Districts or Air Quality Management Districts in California which are required to implement a district-wide smoke management program. The regulatory basis for California's Smoke Management Program, codified under Title 17 of the California Code of Regulations is the "Smoke Management Guidelines for Agricultural and Prescribed Burning" (Guidelines). California's 1987 Guidelines were revised to improve interagency coordination, avoid smoke episodes, and provide continued public safety while providing adequate opportunity for necessary open burning. The revisions to the 1987 Guidelines were approved March 14, 2001. All air districts, with the exception of the San Joaquin Valley Air Pollution Control District (SJAPCD) were required to update their existing rules and Smoke Management Plans to conform to the most recent update to the Guidelines.

Section 80150 of Title 17 specifies the special requirements for open burning in agricultural operations, the growing of crops and the raising of fowl or animals. This section specifically requires the ICAPCD to have rules and regulations that require permits that contain requirements that minimize smoke impacts from agricultural burning.

On a daily basis, the ICAPCD reviews surface meteorological reports from various airport agencies, the NWS, State fire agencies and CARB to help determine whether the day is a burn day. Using a four quadrant map of Imperial County allowed burns are allocated in such a manner as to assure minimal to no smoke impacts safeguarding the public health. Finally, all permit holders are required to notice and advise members of the public of a potential burn. This noticing requirement is known as the Good Neighbor Policy. On September 19, 2016, the ICAPCD declared a No Burn day **(Appendix A).** No complaints were filed for agricultural burning on September 19, 2016.

IV.1.c Review of Source Permitted Inspections and Public Complaints

A query of the ICAPCD permit database was compiled and reviewed for active permitted sources throughout Imperial County and specifically around Calexico, El Centro, Niland, and Westmorland during the September 19, 2016 PM_{10} exceedance. Both permitted and non-permitted sources are required to comply with Regulation VIII requirements that address fugitive dust emissions. The identified permitted sources are Aggregate Products, Inc., US Gypsum Quarry, Imperial Aggregates (Val-Rock, Inc., and Granite Construction), US Gypsum Plaster City, Clean Harbors (Laidlaw Environmental Services), Bullfrog Farms (Dairy), Burrtec Waste Industries, Border Patrol Inspection station, Centinela State Prison, various communications towers not listed and various agricultural operations. Non-permitted sources include the wind farm known as Ocotillo Express, and a solar facility known as CSolar IV West. Finally, the desert regions are under the jurisdiction of the Bureau of Land Management and the California Department of Parks (Including Anza Borrego State Park and Ocotillo Wells).

An evaluation of all inspection reports, air quality complaints, compliance reports, and other documentation indicate no evidence of unusual anthropogenic-based PM_{10} emissions. There were no complaints filed on September 19, 2016, officially declared as a No Burn day, related to agricultural burning, waste burning or dust.

FIGURE 4-2
PERMITTED SOURCES

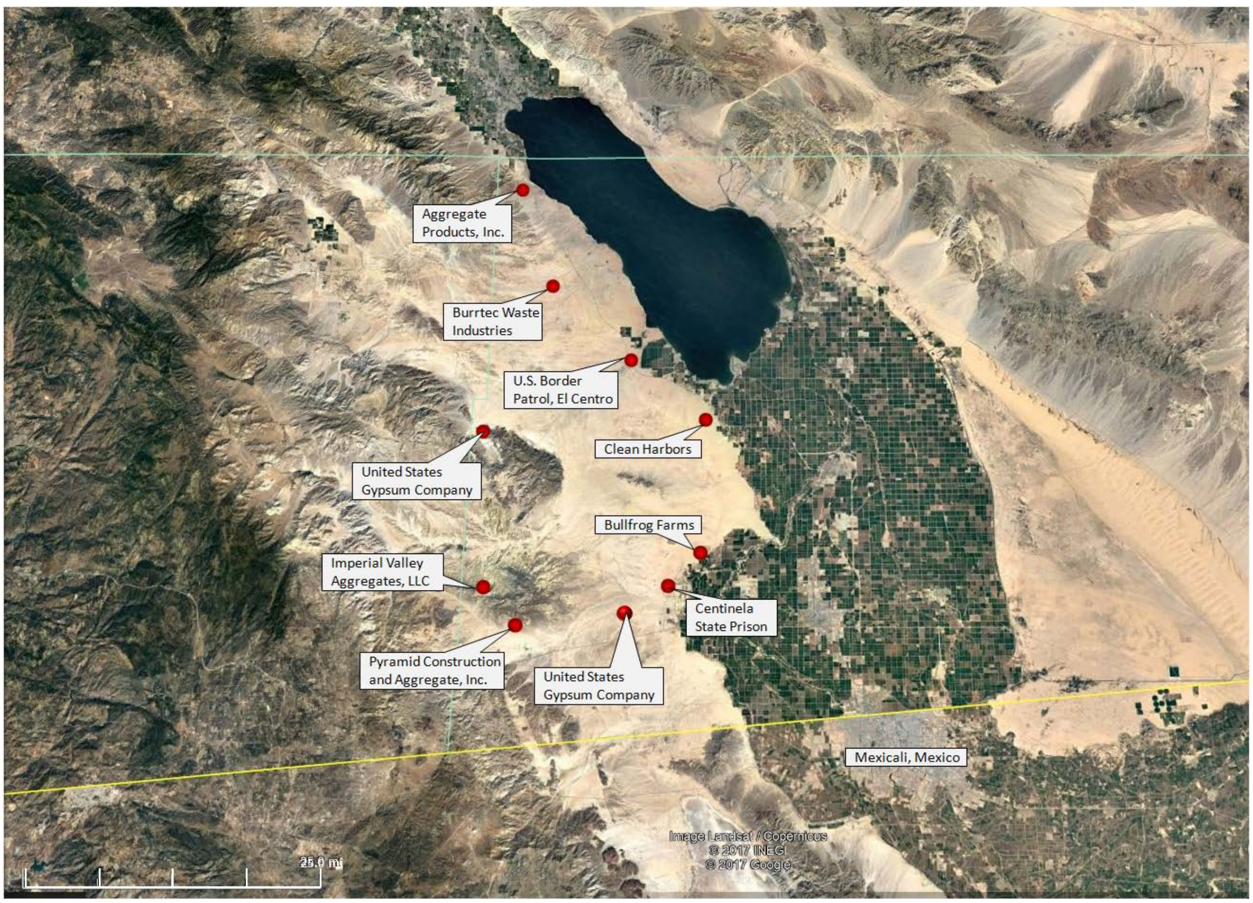

Fig 4-2: The above map identifies those permitted sources located west, northwest and southwest of the Westmorland monitor. The green line to the north denotes the political division between Imperial and Riverside counties. The yellow line below denotes the international border between the United States and Mexico. The green checker-boarded areas are a mixed use of agricultural and community parcels. In addition, either the Bureau of Land Management or the California Department of Parks manages the desert areas. Base map from Google Earth

FIGURE 4-3
NON-PERMITTED SOURCES

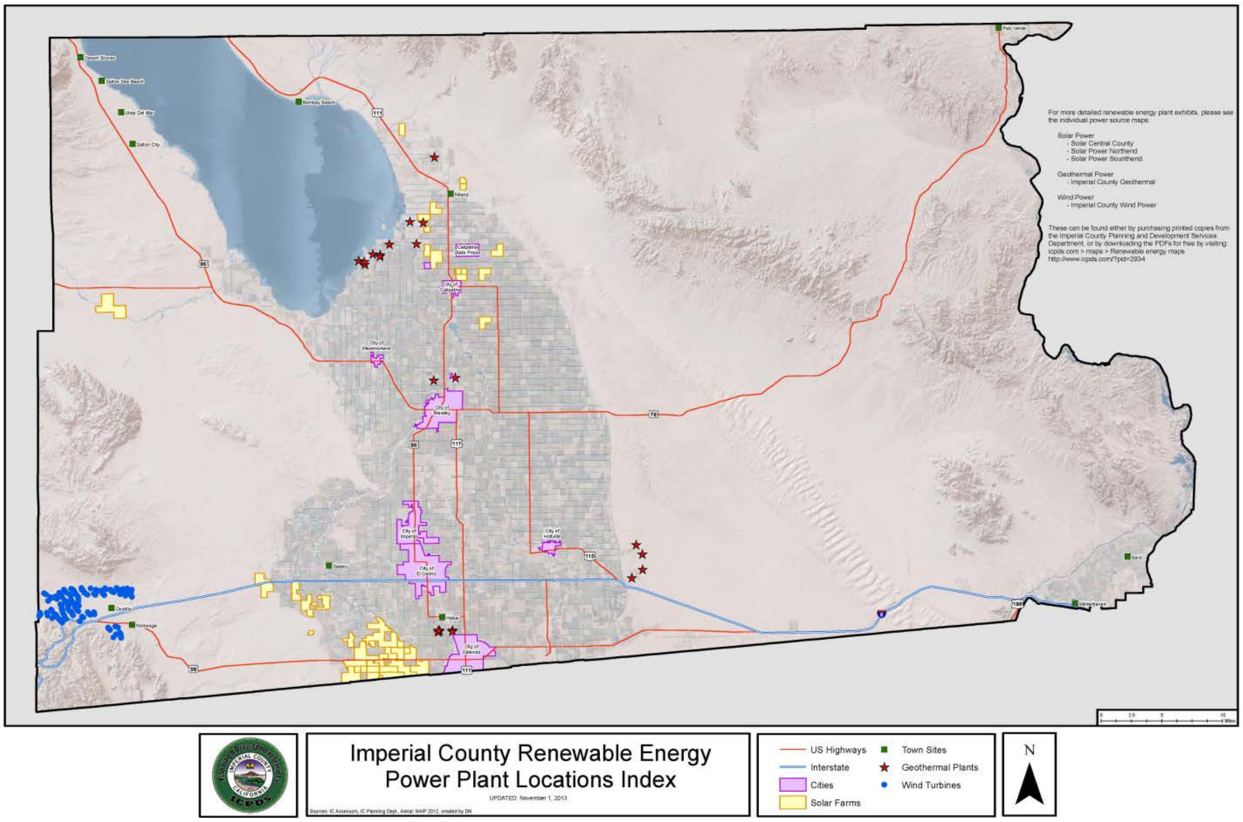

Fig 4-3: The above map identifies those power sources located west, northwest and southwest of the Westmorland monitor. Blue indicate the Wind Turbines, Yellow are the solar farms and stars are geothermal plants.

IV.2 Forecasts and Warnings

Although the ICAPCD published, the National Weather Service (NWS) forecast for September 19, 2016, notification of the possibility of an upper level low-pressure system entraining moisture from the south Monday and Tuesday. This would bring a slight chance of thunderstorms to the San Diego region including the coastal areas. The Phoenix NWS office concentrated its forecast discussion primarily for Arizona but did indicate the potential for an increase in moisture and clouds leading to the return of showers and thunderstorm chances along with cooler temperatures.

The published notification, via the ICAPCD's webpage, forecast for September 19, 2016 included the synopsis for the San Diego and Phoenix NWS offices. The San Diego office identified a low-pressure system off the Southern California coast as potentially drawing moisture from Hurricane Paine into Southern California. The moisture would be accompanied by scattered showers and isolated thunderstorms with dry lightning. The expectation was that during the evening hours additional moisture would move northward allowing for greater chances for showers and isolated thunderstorms. The weather story issued by the San Diego NWS office identified impacts from the moisture sure from Hurricane Paine as lightning strikes from the beaches out to the deserts and wet slick roads.

The Phoenix NWS office explained of increasing clouds leading to a good chance of showers and or light rain over portions of southeast California and southwest Arizona by the evening hours.

IV.3 Wind Observations

Wind data during the event were available from airports in eastern Riverside County, southeastern San Diego County, southwestern Yuma County (Arizona), northern Mexico, and Imperial County (**Table 2-2**). Data were also collected from automated meteorological instruments that were upstream from the Westmorland monitor during the wind event. On September 19, 2016 Imperial County Airport (KIPL) and the El Centro NAF (KNJK) measured winds at or above 25 mph for at least one hour. Automated instruments at upstream locations in Mexico reported winds or gusts at or above 25 mph. Wind speeds of 25 mph are normally sufficient to overcome most PM_{10} control measures. During the September 19, 2016 event, wind speeds were at or above the 25 mph threshold, overcoming the BACM in place.

IV.4 Summary

The weather and air quality forecasts and warnings outlined in this section demonstrate that high winds generated by thunderstorms associated with tropical air surging northward from Hurricane Paine transported dust that caused uncontrollable PM_{10} emissions. The BACM list as part of the control measures in Imperial County for fugitive dust emissions were in place at the time of the event. These control measures are required for areas designated as "serious" non-attainment for PM_{10}, such as Imperial County. Thus, the BACM in place at the time of the event were beyond reasonable. In addition, surface wind measurements at or upstream of the Westmorland monitor during the event were high enough (at or above 25 mph, with wind gusts of 44 mph) that BACM PM_{10} control measures would have been overwhelmed.

Finally, a high wind dust event can be considered as a natural event, even when portions of the wind-driven emissions are anthropogenic, as long as those emissions have a clear causal relationship to the event and were determined to be not reasonably controllable or preventable. This demonstration has shown that the event that occurred on September 19, 2016 was not reasonably controllable or preventable despite the strong and in force BACM within the affected areas in Imperial County. This demonstration has similarly established a clear causal relationship between the exceedances and the high wind event timeline and geographic location. The September 19, 2016 event can be considered an exceptional event under the requirements of the exceptional event rule.

VI Clear Causal Relationship

V.1 Discussion

Meteorological observations for September 19, 2016 identified the movement of a low-pressure trough off the coast of Northern Baja and moisture streaming north form Hurricane Paine located west of Southern Baja. The low-pressure system off the Southern California coast drew mid-level moisture from Hurricane Paine into Southern California. Simultaneously, a weak high pressure over the Rio Grande Valley influencing the low pressures steered them towards the north with the southerly flow over Baja California allowing the intrusion of moisture into San Diego County, Riverside County, Imperial County and Yuma County.

Early September 19, 2016, dense cloud cover moved over Imperial and Yuma counties with virga falling into the dry layer creating strong wind gusts transporting areas of dust within the mountains and passes of San Diego County, northern Baja California. The windblown dust blew into and over natural open deserts, farmlands and populated areas in Imperial County, affecting air quality and causing an exceedance at the Westmorland monitor.[21]

Entrained windblown dust from natural areas, particularly from the natural open desert areas south and southwest of Imperial County, along with anthropogenic sources controlled with BACM, is confirmed by the meteorological and air quality observations on September 19, 2016.

Figure 5-1 through Figure 5-3 illustrate Hurricane Paine and the associated circulating moisture into southeast California, the intense radar returns from thunderstorms, and the resulting southerly winds during key periods on September 19, 2016.

[21] According to the National Weather Service, virga is defined as streaks or wisps of precipitation falling from a cloud but evaporating before reaching the ground. In certain cases, shafts of virga may precede a microburst.

FIGURE 5-1
HURRICANE PAINE MOVES NORTH INTO IMPERIAL COUNTY

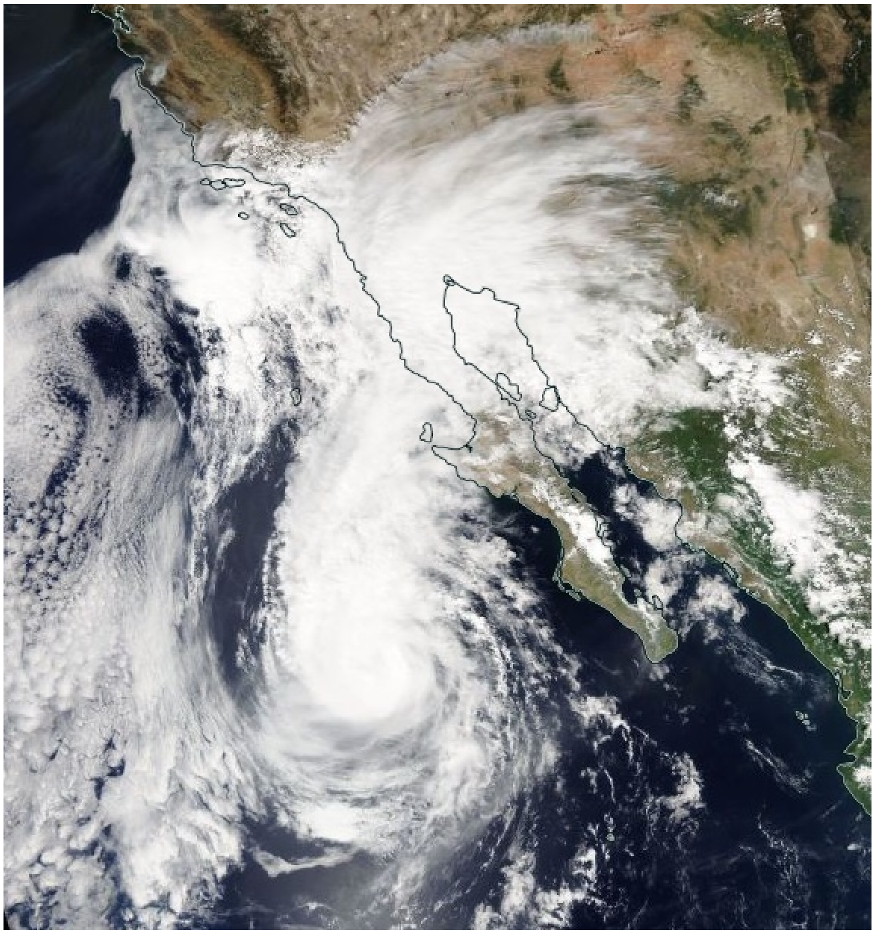

Fig 5-1: Hurricane Paine west of Baja California provided the tropical air into southeast California. This moist air promoted the creation of thunderstorms that led to gusty southerly winds. Source: https://worldview.earthdata.nasa.gov/

FIGURE 5-2
THUNDERSTORMS ACTIVITY

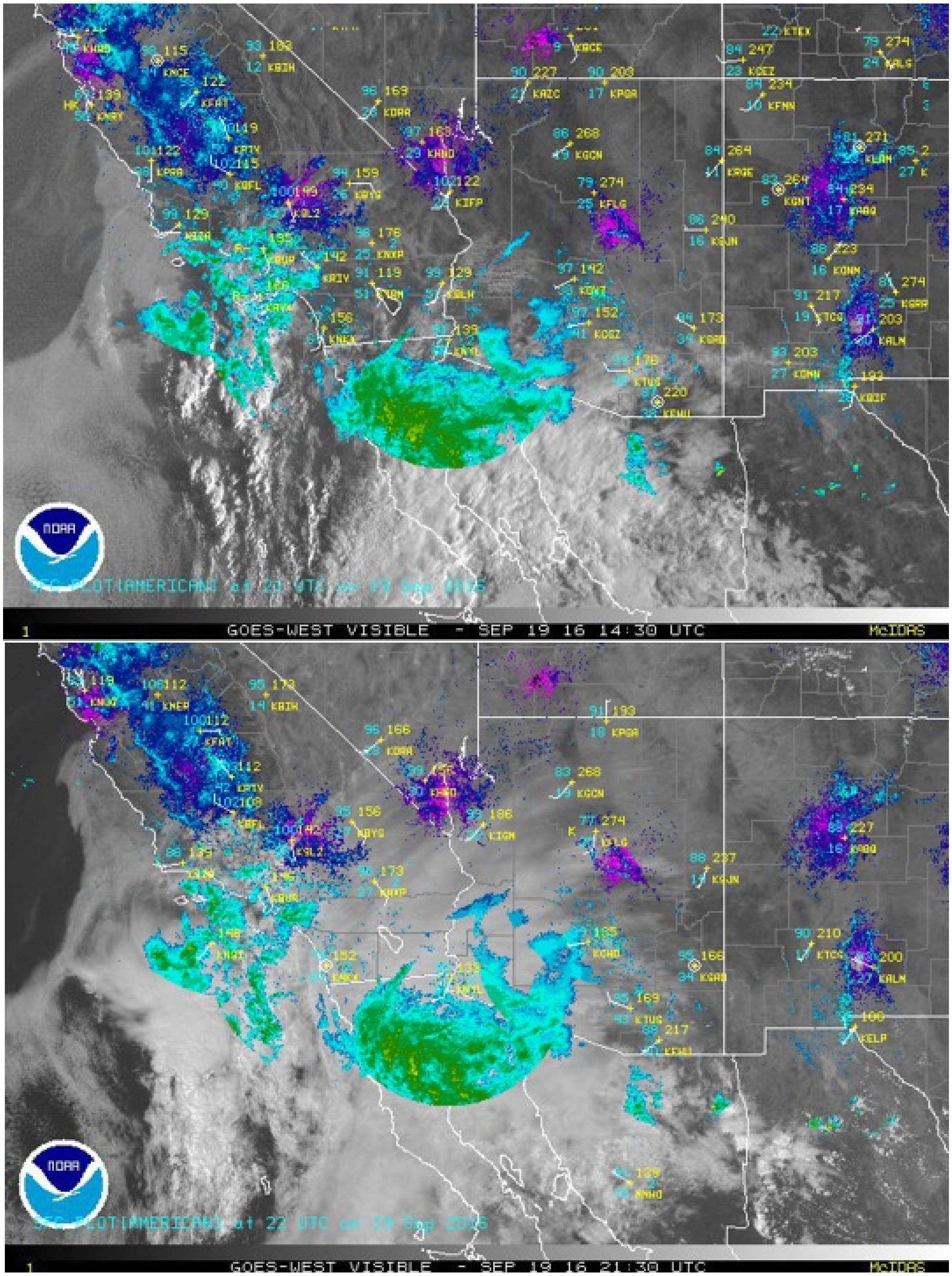

Fig 5-2: The intense thunderstorm activity generated by the tropical air surging into southeast California is illustrated in these two GOES-W images captured at 0630 and 1330 PST on September 19. Source: http://www.ssd.noaa.gov/goes/west/sw.html

FIGURE 5-3
HIGH WINDS IN SOUTHEASTERN CALIFORNIA

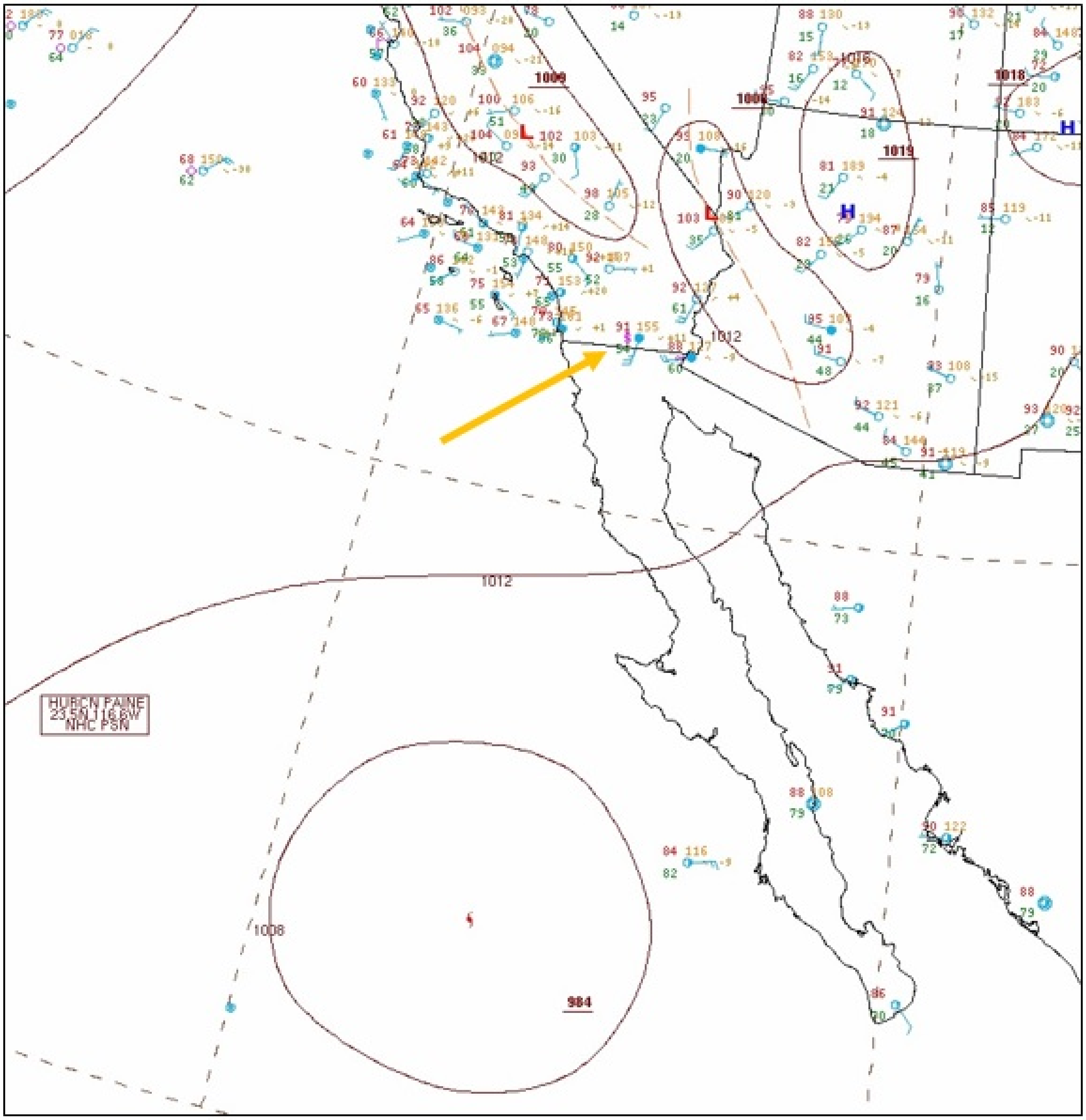

Fig 5-3: Gusty southerly winds over 25 mph transported and suspended dust (maroon symbol) as recorded at the El Centro NAF (KNJK) on September 19, 2016. Image time 00Z September 20, 2016 (1600 PST September 19, 2016). Hurricane Paine is west of Baja California. Source: WPC Surface Analysis Archives;
http://www.wpc.ncep.noaa.gov/archives/web_pages/sfc/sfc_archive.php

The EPA accepts a high wind threshold for sustained winds of 25 mph in California and 12 other states.[22] **Tables 5-1 through 5-5** provide a temporal relationship of wind speeds, wind direction,

[22] "Treatment of Data Influenced by Exceptional Events; Final Guidance", FR Vol. 81, No. 191, 68279, October 3, 2016

wind gusts (if available), and PM_{10} concentrations at monitoring stations on September 19, 2016. Although only Westmorland exceeded, tables for all stations are shown as all monitors measured elevated hourly concentrations during key periods. The tables show that peak hourly concentrations took place immediately following or during the period of high upstream wind speeds. Tables are presented in descending order of 24-hour averages for each monitor.

TABLE 5-1
WESTMORLAND PM_{10} CONCENTRATIONS AND WIND SPEEDS ON SEPTEMBER 19, 2016

Imperial County Airport (KIPL)				Yuma, AZ MCAS (KNYL)					El Centro NAF (KNJK)					Mexicali, MX Intl. Airport (MMML)				Westmorland FEM	
HR	W/	W/D	W/G	HR	W/S	W/D	W/G	Obs.	HR	W/S	W/D	W/G	Obs.	HR	W/S	W/D	Obs.	HOUR	PM_{10} (µg/m^3
53	7	250		57	5	160			56	9	260			0:40				0000	11
153	5	310		157	7	160			156	6	290			1:40				0100	20
253	0	0		257	11	160			256	0	0			2:40				0200	14
353	0	0		357	14	160			356	0	0			3:40				0300	12
453	3	140		457	10	170			456	3	170			4:40				0400	19
553	3	200		557	0	0			556	5	160			5:40	5	100		0500	50
653	3	80		657	3	VR			656	3	270			6:45	5	90		0600	159
753	5	120		757	7	140			756	5	90			7:54	5	110		0700	130
853	7	150		857	15	180			856	5	150			8:54	13	130		0800	127
953	8	160		957	15	190			956	7	140			9:50	9	140		0900	140
1053	9	180		1057	14	190			1056	8	170			10:50	15	120		1000	78
1153	6	160		1157	15	190			1156	7	160			11:55	14	140		1100	117
1253	8	200		1257	11	190			1256	10	150			12:52	10	150		1200	109
1353	15	200		1357	14	200			1356	23	190	29	BLDU	13:47	10	170	BLDU	1300	81
1418	21	180	28	1457	10	140			1456	29	180	33	BLDU	14:59	18	180	BLDU	1400	716
1553	16	210	23	1557	23	250	25*	BLDU	1556	26	190	33	BLDU	15:47	22	190	BLDU	1500	800
1653	34	190	44	1657	15	240	21	BLDU	1656	22	200	38	BLDU	16:51	16	210	BLDU	1600	995
1753	20	240		1757	14	270		BLDU	1756	23	220			17:28	15	240		1700	470
1853	16	260		1857	11	270		BLDU	1856	18	250			18:42	16	240		1800	39
1953	10	280		1957	7	300		BLDU	1956	13	280			19:51	13	300		1900	25
2053	8	260		2057	11	310			2056	7	260			20:51	8	280		2000	11
2153	0	0		2157	9	300			2156	9	240			21:50	7	320		2100	26
2253	0	0		2257	6	20			2256	0	0			22:46	9	340		2200	49
2353	5	20		2357	10	50			2356	5	40			23:43	8	350		2300	46

***Wind data for KNJK, KNYL, and KIPL from the NCEI's QCLCD system. Wind data for Mexicali Airport (MMML) from the University of Utah's MesoWest system. Yuma gust was reported at 16:48. Wind speeds = mph; Direction = degrees. BLDU = blowing dust

TABLE 5-2
NILAND PM_{10} CONCENTRATIONS AND WIND SPEEDS ON SEPTEMBER 19, 2016

Imperial County Airport (KIPL)				Yuma, AZ MCAS (KNYL)					El Centro NAF (KNJK)					Mexicali, MX Intl. Airport (MMML)				Niland (English Rd) FEM	
HR	W/S	W/D	W/G	HR	W/S	W/D	W/G	Obs.	HR	W/S	W/D	W/G	Obs.	HR	W/S	W/D	Obs.	HOUR	PM_{10} (μg/m^3
53	7	250		57	5	160			56	9	260			0:40				0000	39
153	5	310		157	7	160			156	6	290			1:40				0100	32
253	0	0		257	11	160			256	0	0			2:40				0200	51
353	0	0		357	14	160			356	0	0			3:40				0300	31
453	3	140		457	10	170			456	3	170			4:40				0400	41
553	3	200		557	0	0			556	5	160			5:40	5	100		0500	34
653	3	80		657	3	VR			656	3	270			6:45	5	90		0600	49
753	5	120		757	7	140			756	5	90			7:54	5	110		0700	64
853	7	150		857	15	180			856	5	150			8:54	13	130		0800	45
953	8	160		957	15	190			956	7	140			9:50	9	140		0900	39
1053	9	180		1057	14	190			1056	8	170			10:50	15	120		1000	47
1153	6	160		1157	15	190			1156	7	160			11:55	14	140		1100	60
1253	8	200		1257	11	190			1256	10	150			12:52	10	150		1200	75
1353	15	200		1357	14	200			1356	23	190	29	**BLDU**	13:47	10	170	**BLDU**	1300	76
1418	21	180	28	1457	10	140			1456	29	180	33	**BLDU**	14:59	18	180	**BLDU**	1400	87
1553	16	210	23	1557	23	250	25*	**BLD**	1556	26	190	33	**BLDU**	15:47	22	190	**BLDU**	1500	98
1653	34	190	44	1657	15	240	21	**BLD**	1656	22	200	38	**BLDU**	16:51	16	210	**BLDU**	1600	995
1753	20	240		1757	14	270		**BLD**	1756	23	220			17:28	15	240		1700	755
1853	16	260		1857	11	270		**BLD**	1856	18	250			18:42	16	240		1800	402
1953	10	280		1957	7	300		**BLD**	1956	13	280			19:51	13	300		1900	46
2053	8	260		2057	11	310			2056	7	260			20:51	8	280		2000	157
2153	0	0		2157	9	300			2156	9	240			21:50	7	320		2100	94
2253	0	0		2257	6	20			2256	0	0			22:46	9	340		2200	54
2353	5	20		2357	10	50			2356	5	40			23:43	8	350		2300	21

*****Wind data for KNJK, KNYL, and KIPL from the NCEI's QCLCD system. Wind data for Mexicali Airport (MMML) from the University of Utah's MesoWest system. Yuma gust was reported at 16:48. Wind speeds = mph; Direction = degrees. BLDU = blowing dust

TABLE 5-3
CALEXICO PM_{10} CONCENTRATIONS AND WIND SPEEDS ON SEPTEMBER 19, 2016

Imperial County Airport (KIPL)				Yuma, AZ MCAS (KNYL)					El Centro NAF (KNJK)					Mexicali, MX Intl. Airport (MMML)				Calexico FEM	
HR	W/S	W/D	W/G	HR	W/S	W/D	W/G	Obs.	HR	W/S	W/D	W/G	Obs.	HR	W/S	W/D	Obs.	HOUR	PM_{10} (µg/m³)
53	7	250		57	5	160			56	9	260			0:40				0000	32
153	5	310		157	7	160			156	6	290			1:40				0100	27
253	0	0		257	11	160			256	0	0			2:40				0200	48
353	0	0		357	14	160			356	0	0			3:40				0300	31
453	3	140		457	10	170			456	3	170			4:40				0400	71
553	3	200		557	0	0			556	5	160			5:40	5	100		0500	195
653	3	80		657	3	VR			656	3	270			6:45	5	90		0600	224
753	5	120		757	7	140			756	5	90			7:54	5	110		0700	320
853	7	150		857	15	180			856	5	150			8:54	13	130		0800	160
953	8	160		957	15	190			956	7	140			9:50	9	140		0900	114
1053	9	180		1057	14	190			1056	8	170			10:50	15	120		1000	68
1153	6	160		1157	15	190			1156	7	160			11:55	14	140		1100	49
1253	8	200		1257	11	190			1256	10	150			12:52	10	150		1200	79
1353	15	200		1357	14	200			1356	23	190	29	BLDU	13:47	10	170	BLDU	1300	91
1418	21	180	28	1457	10	140			1456	29	180	33	BLDU	14:59	18	180	BLDU	1400	395
1553	16	210	23	1557	23	250	25*	BLDU	1556	26	190	33	BLDU	15:47	22	190	BLDU	1500	807
1653	34	190	44	1657	15	240	21	BLDU	1656	22	200	38	BLDU	16:51	16	210	BLDU	1600	264
1753	20	240		1757	14	270		BLDU	1756	23	220			17:28	15	240		1700	53
1853	16	260		1857	11	270		BLDU	1856	18	250			18:42	16	240		1800	29
1953	10	280		1957	7	300		BLDU	1956	13	280			19:51	13	300		1900	13
2053	8	260		2057	11	310			2056	7	260			20:51	8	280		2000	11
2153	0	0		2157	9	300			2156	9	240			21:50	7	320		2100	11
2253	0	0		2257	6	20			2256	0	0			22:46	9	340		2200	9
2353	5	20		2357	10	50			2356	5	40			23:43	8	350		2300	15

*Wind data for KNJK, KNYL, and KIPL from the NCEI's QCLCD system. Wind data for Mexicali Airport (MMML) from the University of Utah's MesoWest system. Yuma gust was reported at 16:48. Wind speeds = mph; Direction = degrees. BLDU = blowing dust

TABLE 5-4
EL CENTRO PM_{10} CONCENTRATIONS AND WIND SPEEDS ON SEPTEMBER 19, 2016

Imperial County Airport (KIPL)				Yuma, AZ MCAS (KNYL)					El Centro NAF (KNJK)					Mexicali, MX Intl. Airport (MMML)				El Centro FEM	
HR	W/S	W/D	W/G	HR	W/S	W/D	W/G	Obs.	HR	W/S	W/D	W/G	Obs.	HR	W/S	W/D	Obs.	HOUR	PM_{10} (µg/m³
53	7	250		57	5	160			56	9	260			0:40				0000	25
153	5	310		157	7	160			156	6	290			1:40				0100	21
253	0	0		257	11	160			256	0	0			2:40				0200	16
353	0	0		357	14	160			356	0	0			3:40				0300	15
453	3	140		457	10	170			456	3	170			4:40				0400	29
553	3	200		557	0	0			556	5	160			5:40	5	100		0500	58
653	3	80		657	3	VR			656	3	270			6:45	5	90		0600	102
753	5	120		757	7	140			756	5	90			7:54	5	110		0700	171
853	7	150		857	15	180			856	5	150			8:54	13	130		0800	156
953	8	160		957	15	190			956	7	140			9:50	9	140		0900	164
1053	9	180		1057	14	190			1056	8	170			10:50	15	120		1000	97
1153	6	160		1157	15	190			1156	7	160			11:55	14	140		1100	81
1253	8	200		1257	11	190			1256	10	150			12:52	10	150		1200	79
1353	15	200		1357	14	200			1356	23	190	29	BLDU	13:47	10	170	BLDU	1300	132
1418	21	180	28	1457	10	140			1456	29	180	33	BLDU	14:59	18	180	BLDU	1400	544
1553	16	210	23	1557	23	250	25*	BLDU	1556	26	190	33	BLDU	15:47	22	190	BLDU	1500	286
1653	34	190	44	1657	15	240	21	BLDU	1656	22	200	38	BLDU	16:51	16	210	BLDU	1600	536
1753	20	240		1757	14	270		BLDU	1756	23	220			17:28	15	240		1700	73
1853	16	260		1857	11	270		BLDU	1856	18	250			18:42	16	240		1800	39
1953	10	280		1957	7	300		BLDU	1956	13	280			19:51	13	300		1900	3
2053	8	260		2057	11	310			2056	7	260			20:51	8	280		2000	2
2153	0	0		2157	9	300			2156	9	240			21:50	7	320		2100	5
2253	0	0		2257	6	20			2256	0	0			22:46	9	340		2200	7
2353	5	20		2357	10	50			2356	5	40			23:43	8	350		2300	10

***Wind data for KNJK, KNYL, and KIPL from the NCEI's QCLCD system. Wind data for Mexicali Airport (MMML) from the University of Utah's MesoWest system. Yuma gust was reported at 16:48. Wind speeds = mph; Direction = degrees. BLDU = blowing dust

TABLE 5-5
BRAWLEY PM_{10} CONCENTRATIONS AND WIND SPEEDS ON SEPTEMBER 19, 2016

Imperial County Airport (KIPL)				Yuma, AZ MCAS (KNYL)					El Centro NAF (KNJK)					Mexicali, MX Intl. Airport (MMML)				Brawley FEM	
HR	W/S	W/D	W/G	HR	W/S	W/D	W/G	Obs.	HR	W/S	W/D	W/G	Obs.	HR	W/S	W/D	Obs.	HOUR	PM_{10} (µg/m^3
53	7	250		57	5	160			56	9	260			0:40				0000	30
153	5	310		157	7	160			156	6	290			1:40				0100	21
253	0	0		257	11	160			256	0	0			2:40				0200	21
353	0	0		357	14	160			356	0	0			3:40				0300	31
453	3	140		457	10	170			456	3	170			4:40				0400	43
553	3	200		557	0	0			556	5	160			5:40	5	100		0500	48
653	3	80		657	3	VR			656	3	270			6:45	5	90		0600	99
753	5	120		757	7	140			756	5	90			7:54	5	110		0700	118
853	7	150		857	15	180			856	5	150			8:54	13	130		0800	70
953	8	160		957	15	190			956	7	140			9:50	9	140		0900	81
1053	9	180		1057	14	190			1056	8	170			10:50	15	120		1000	80
1153	6	160		1157	15	190			1156	7	160			11:55	14	140		1100	80
1253	8	200		1257	11	190			1256	10	150			12:52	10	150		1200	83
1353	15	200		1357	14	200			1356	23	190	29	**BLDU**	13:47	10	170	**BLDU**	1300	58
1418	21	180	28	1457	10	140			1456	29	180	33	**BLDU**	14:59	18	180	**BLDU**	1400	291
1553	16	210	23	1557	23	250	25*	**BLD**	1556	26	190	33	**BLDU**	15:47	22	190	**BLDU**	1500	429
1653	34	190	44	1657	15	240	21	**BLD**	1656	22	200	38	**BLDU**	16:51	16	210	**BLDU**	1600	435
1753	20	240		1757	14	270		**BLD**	1756	23	220			17:28	15	240		1700	221
1853	16	260		1857	11	270		**BLD**	1856	18	250			18:42	16	240		1800	36
1953	10	280		1957	7	300		**BLD**	1956	13	280			19:51	13	300		1900	20
2053	8	260		2057	11	310			2056	7	260			20:51	8	280		2000	5
2153	0	0		2157	9	300			2156	9	240			21:50	7	320		2100	13
2253	0	0		2257	6	20			2256	0	0			22:46	9	340		2200	36
2353	5	20		2357	10	50			2356	5	40			23:43	8	350		2300	41

*****Wind data for KNJK, KNYL, and KIPL from the NCEI's QCLCD system. Wind data for Mexicali Airport (MMML) from the University of Utah's MesoWest system. Yuma gust was reported at 16:48. Wind speeds = mph; Direction = degrees. BLDU = blowing dust

As a reminder, both the San Diego and Phoenix NWS offices identified a moisture surge northward the evening prior to September 19, 2016 in the southerly flow ahead of the closed upper low off the coast of Northern Baja and a deeper moisture from Hurricane Paine that moved into Southern California. This put the mountains and lower deserts on the western edge of the deep moisture.

Essentially, the presence of the large cutoff low centered west of San Diego and the cyclonic circulation of Hurricane Paine brought a significant amount of tropical moisture into southeast California and southwest Arizona during the evening hours of September 18, 2016 through Tuesday, September 20, 2016.

Both NWS offices identified clouds moving north ahead of the low-pressure trough off the coast of Northern Baja and from the moisture streaming north from Hurricane Paine located west of Baja. Specifically, the Phoenix NWS office discussed the estimated onset of rain in Imperial and Yuma Counties by late Monday, September 19, 2016 afternoon with lightning activity within northeast Sonora and a few strikes in the northern Gulf of California.[23] In response to the moving system, the Phoenix NWS office updated its forecast to include moderate to strong southerly surface winds with local gusts 27 to 34 mph producing local blowing dust, which prompted an Urgent Weather Message for blowing dust. Both NWS offices confirmed the strong wind gusts over the lower deserts.[24] The Phoenix NWS office published a Public Information Statement identifying top wind speeds in Riverside, Imperial and Yuma counties. Top winds in Riverside measured 38 mph, in Imperial 49 mph and in Yuma 32 mph.[25]

Locally, all airports including the Yuma MCAS (KNYL) and the Mexicali International Airport all measured elevated winds and gusts. At the Imperial County Airport (KIPL) and El Centro NAF (KNJK), winds were light until midafternoon when winds and gusts from the south elevate. Measured peak winds at Imperial County Airport (KIPL) reached 34 mph while measured peak gusts were 44 mph. The airport measured one hour of winds above the 25 mph threshold, while the El Centro NAF (KNJK) measured two hours of winds above 25 mph. upstream wind sites in Yuma, Arizona, and several locations in Mexico measured strong winds and/or gusts. All the air monitors in Imperial County, except for the Brawley monitor, measured elevated concentrations above 100 µg/m^3. Brawley measured 99 µg/m^3.

Figure 5-4 provides wind data, concentration data superimposed over a six-hour HYSPLIT back-trajectory. As a reminder, the trajectory ends at 1600 PST on September 19, 2016, coincident with the Westmorland hourly measured peak concentration.

[23] Area Forecast Discussion, National Weather Service Phoenix AZ, 116 PM PST (216 PM MST) Monday, September 19, 2016
[24] Area Forecast Discussion, National Weather Service San Diego CA, 808 PM PST (908 PM PDT), Monday, September 19, 2016
[25] Public Information Statement, National Weather Service Phoenix AZ, 743 PMPST (843 PM MST), Monday, September 19,2016

FIGURE 5-4
EXCEEDANCE ANALYSIS FOR MONDAY, SEPTEMBER 19, 2016

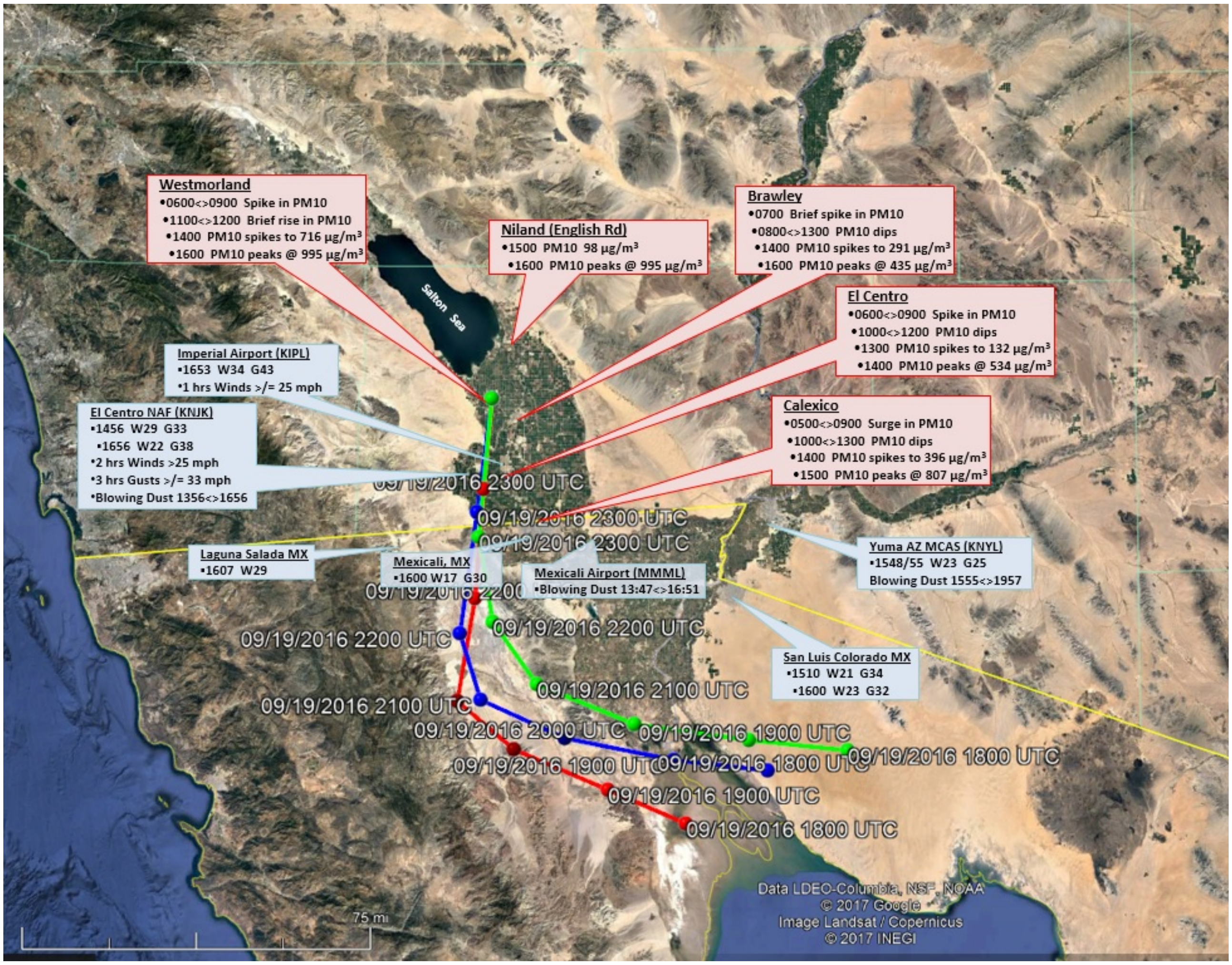

Fig 5-4: A six-hour HYSPLIT trajectory combined with wind speeds and PM_{10} concentrations ending at Westmorland at 1600 PST coincident with hourly measured peak concentrations. Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100 m; green indicates airflow at 500m. Yellow line indicates the international border. Dynamically generated through NOAA's Air Resources Laboratory HYSPLIT model. Base map from Google Earth

Figures 5-5 through 5-9 depict PM_{10} concentrations and wind speeds over a 72-hour period at Westmorland and the other monitors. As mentioned above all monitors in Imperial County measured concentrations above 100 µg/m^3, except for Brawley. Fluctuations in hourly concentrations at the monitors over 72 hours show a positive correlation with wind speeds and gusts at upstream sites.

FIGURE 5-5
WESTMORLAND PM_{10} CONCENTRATIONS & WIND SPEED CORRELATION

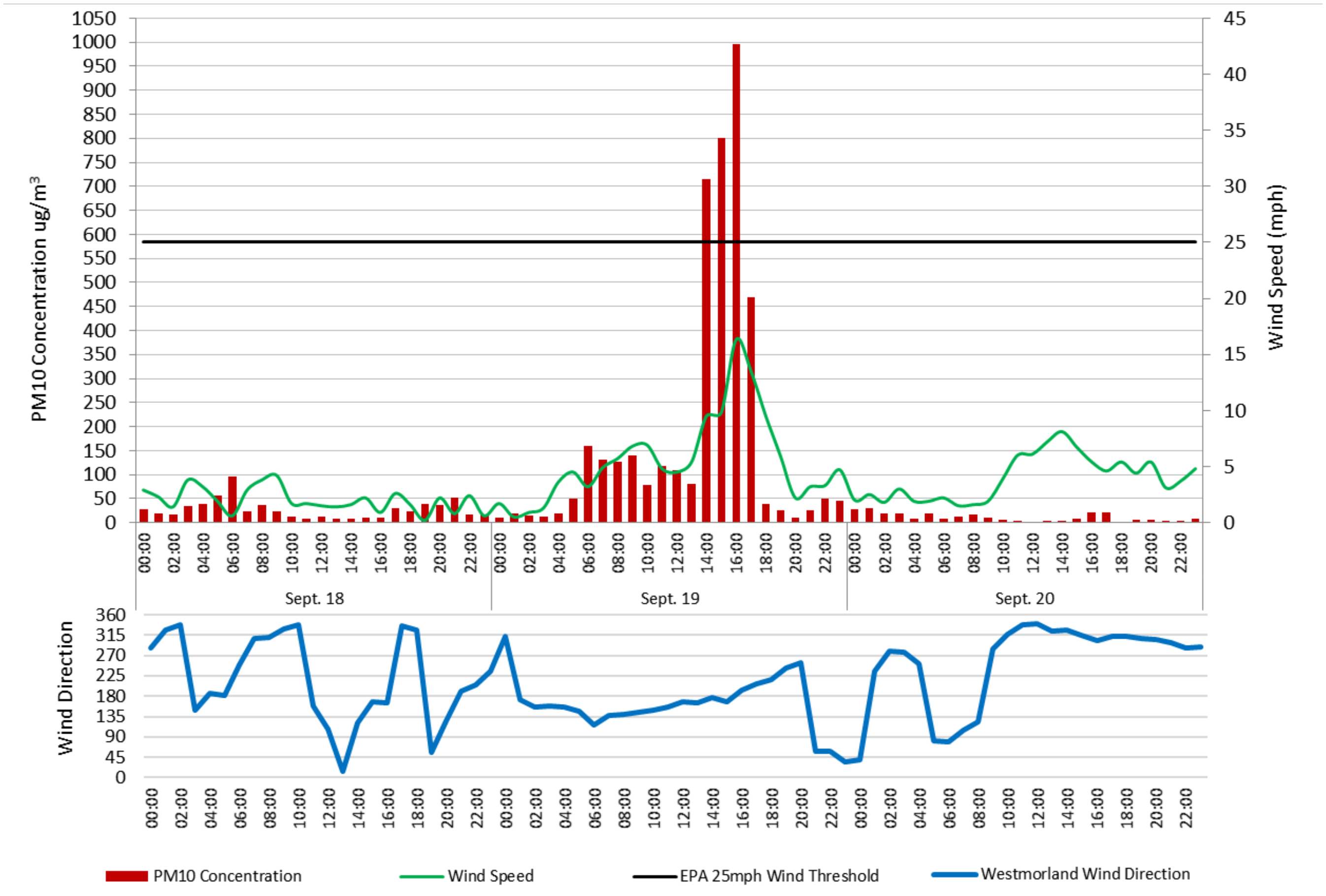

Fig 5-5: Winds at Westmorland remained at moderate levels however, gusts, which is not measured by the Westmorland station, played a significant role in causing windblown dust to affect air quality and the air monitors in Imperial County. Black line indicates 25 mph threshold. Air quality and wind data from the EPA's AQS data bank

FIGURE 5-6
BRAWLEY PM_{10} CONCENTRATIONS & WIND SPEED CORRELATION

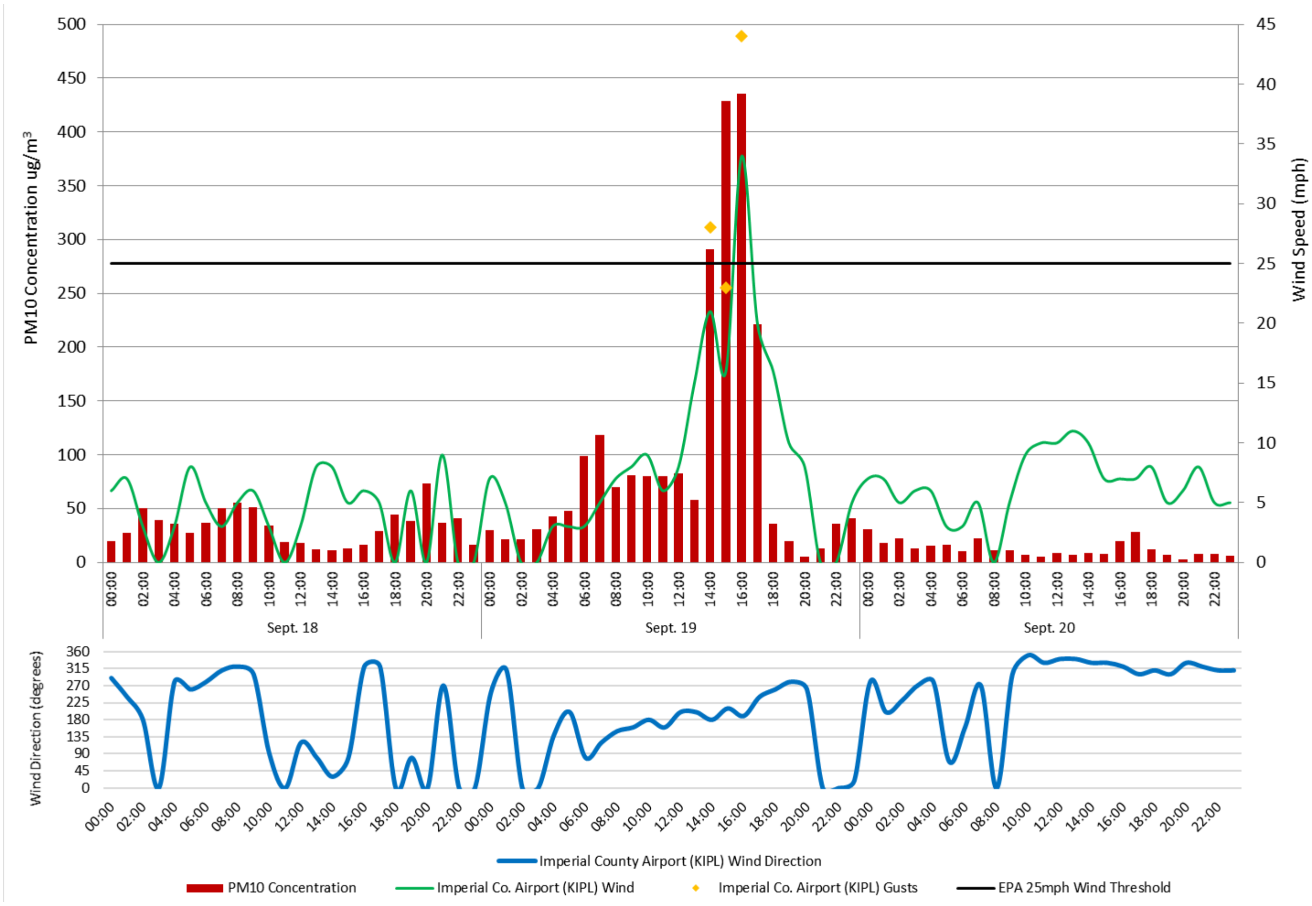

Fig 5-6: Fluctuations in hourly concentrations over 72 hours show a positive correlation with wind speeds, and particularly gusts, at Imperial County Airport (KIPL). The Brawley station does not measure wind. Black line indicates 25 mph threshold. Air quality data from the EPA's AQS data bank. Wind data from the NCEI's QCLCD system

FIGURE 5-7
CALEXICO PM_{10} CONCENTRATIONS & WIND SPEED CORRELATION

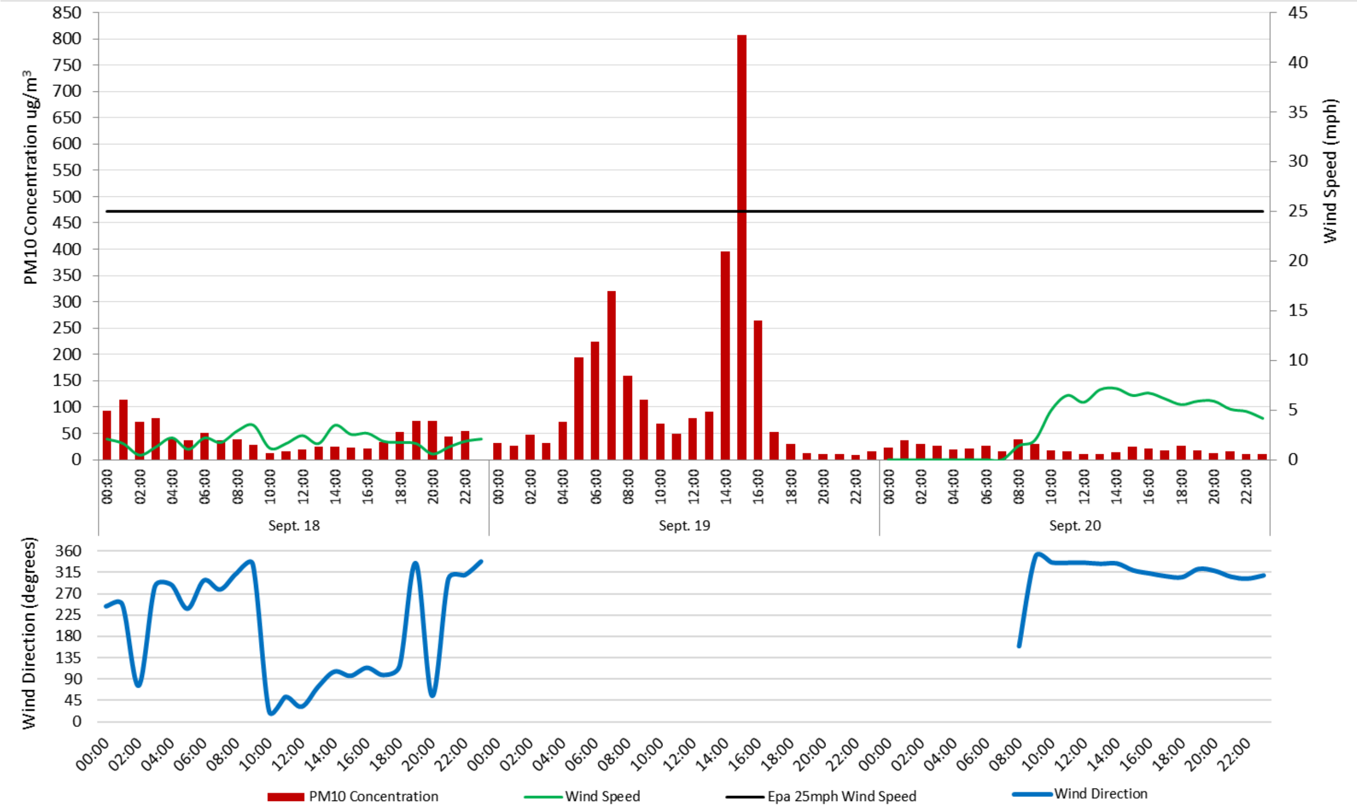

Fig 5-7: While the Calexico station did not have a properly operating meteorological instrument, it is likely that the station followed a similar trend as the other stations, where high upstream winds transported dust downstream where lower wind speeds at the monitor allowed dust to be deposited. Black line indicates 25 mph threshold. Air quality and wind data from the EPA's AQS data bank

FIGURE 5-8
EL CENTRO PM_{10} CONCENTRATIONS & WIND SPEED CORRELATION

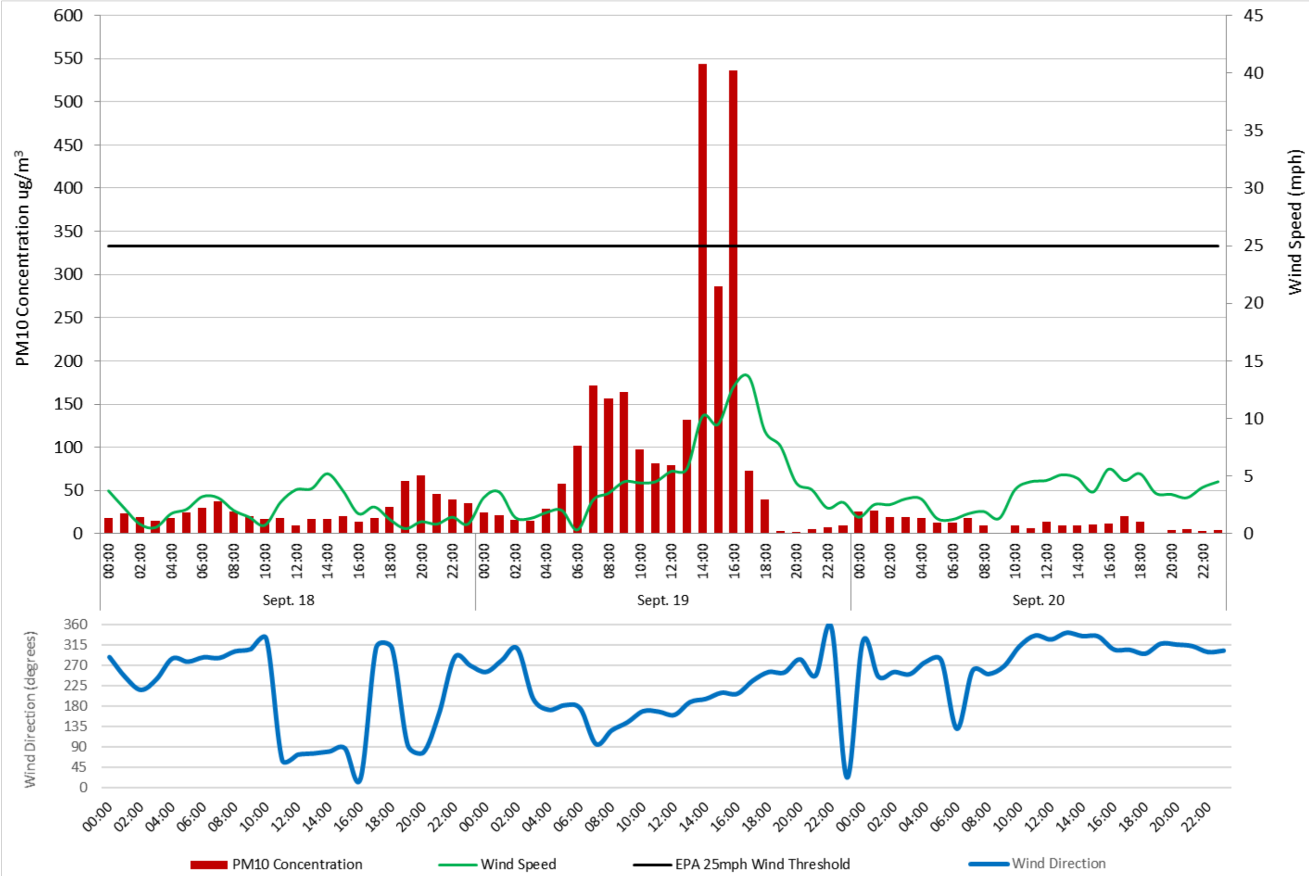

Fig 5-8: While winds at El Centro remained at moderate levels, gusts, not measured by the El Centro station, played a significant role in causing windblown dust to affect air quality and the air monitors in Imperial County. Black line indicates 25 mph threshold. Air quality and wind data from the EPA's AQS data bank

FIGURE 5-9

NILAND (ENGLISH RD) PM$_{10}$ CONCENTRATIONS & WIND SPEED CORRELATION

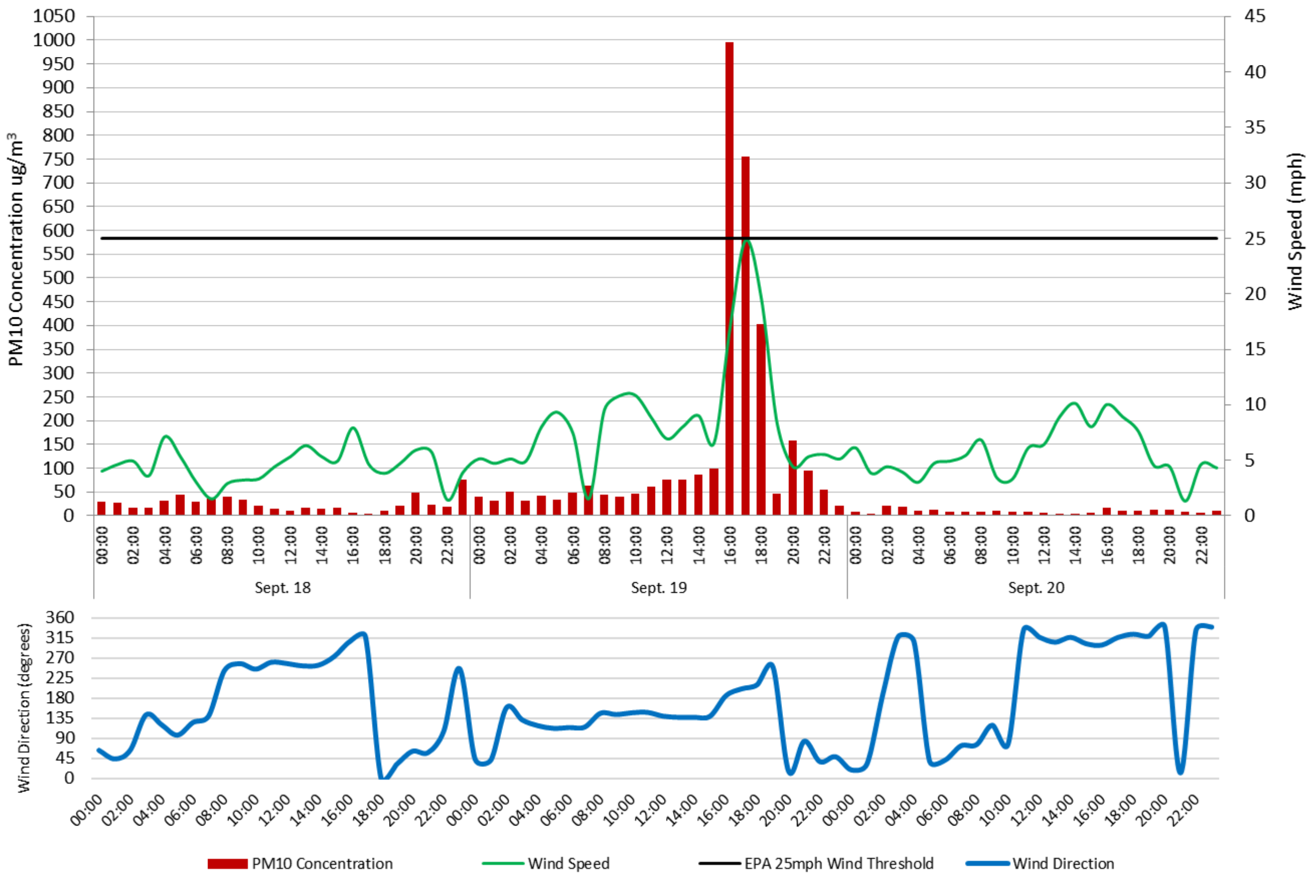

Fig 5-9: Winds at Niland did not reached the 25 mph threshold this station did measures slightly higher winds than other stations. In any event, gusts, not measured by the Niland station, played a significant role in causing windblown dust. Black line indicates 25 mph threshold. Air quality and wind data from the EPA's AQS data bank

Figure 5-10 depicts the relationship between the 72-hour PM$_{10}$ fluctuations by the Westmorland monitor together with upstream wind speeds. A positive correlation is evident between an increase in wind speeds, including gusts and increases in concentrations at the monitor. **Appendix C** contains additional graphs illustrating the relationship between PM$_{10}$ concentrations and wind speeds from region monitoring sites within Imperial County, eastern Riverside County, and Yuma, Arizona during the wind event.

FIGURE 5-10
PM_{10} CONCENTRATIONS & UPSTREAM WIND SPEED CORRELATIONS

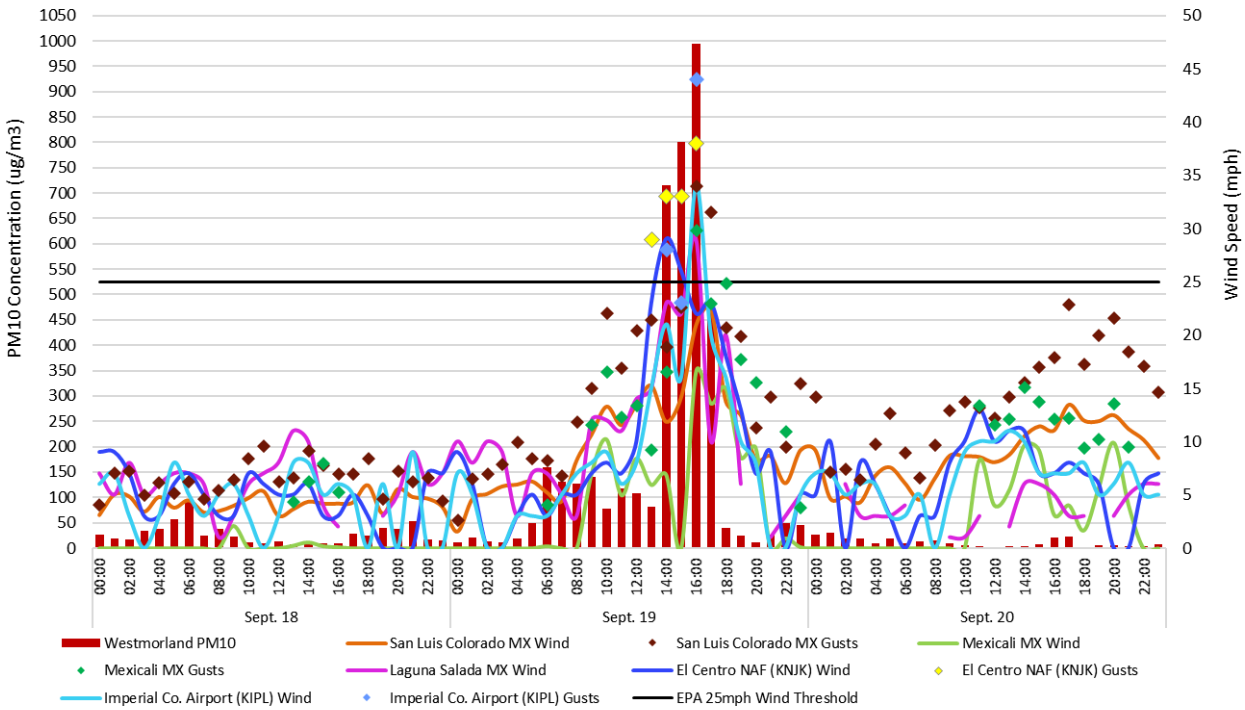

Fig 5-10: This graph illustrates the 72-hour PM_{10} fluctuations by the Westmorland monitor together with upstream wind speeds. A positive correlation between increases in wind speed is evident, particularly with gusts. Black line indicates the 25 mph threshold. Air quality data from the EPA's AQS data bank. Wind data for KIPL and KNJK from the NCEI's QCLCD system. All others from the University of Utah's MesoWest

Figure 5-11 compares the 72-hour concentrations at Brawley, Calexico, El Centro, Westmorland, and Niland with visibility[26] at local airports between September 18, 2016 and September 20, 2016. Generally, drops in visibility correspond to highest hourly concentrations at the monitors.

[26] According to the NWS there is a difference between human visibility and the visibility measured by an Automated Surface Observing System (ASOS) or an Automated Weather Observing System (AWOS). The automated sensors measure clarity of the air vs. how far one can "see". The more moisture, dust, snow, rain, or particles in the light beam the more light scattered. The sensor measures the return every 30 seconds. The visibility value transmitted is the average 1-minute value from the past 10 minutes. The sensor samples only a small segment of the atmosphere, 0.75 feet therefore an algorithm is used to provide a representative visibility. Siting of the visibility sensor is critical and large areas should provide multiple sensors to provide a representative observation; http://www.nws.noaa.gov/asos/vsby.htm.

FIGURE 5-11
72-HOUR TIME SERIES PM_{10} CONCENTRATIONS AND VISIBILITY

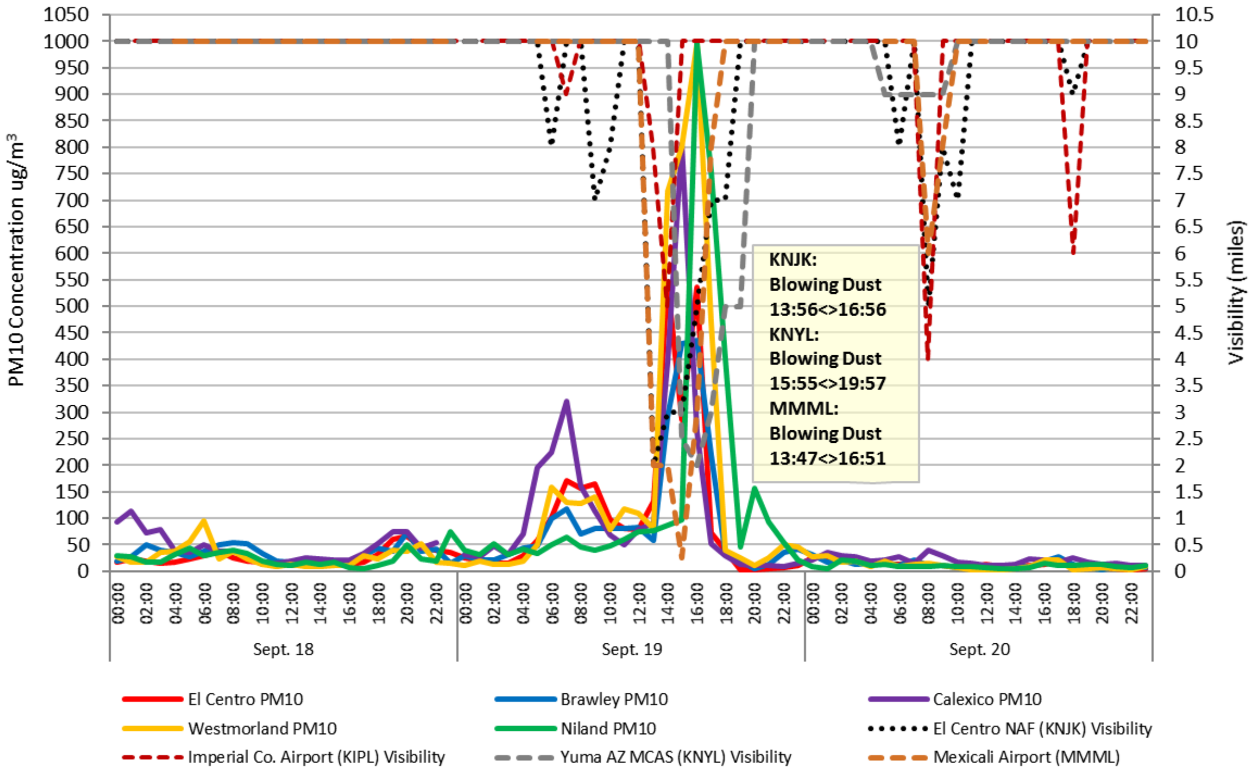

Fig 5-11: Visibility as reported from Imperial County Airport (KIPL), El Centro NAF (KNJK), Yuma MCAS (KNYL), and Mexicali International Airport (MMML) show that visibility dipped significantly at the airfields coincident to peak concentrations at Brawley, Calexico, El Centro, Niland, and Westmorland. Visibility data from the NCEI's QCLCD data bank

As discussed above, the Phoenix NWS office issued a Blowing Dust Advisory for Imperial County and neighboring areas.[27]

Figure 5-12 illustrates the level of the Air Quality Index (AQI) in Westmorland.[28] At Westmorland air quality remained in the "Green" or Good category (PM10 0-50 µg/m^3) until 4am. By 6am air quality reduced to an orange level for the remainder of the day indicating air quality as unhealthy for sensitive groups.

[27] Blowing Dust Advisory is issued when blowing dust is expected to reduce visibility to between 1/4 and 1 mile, generally with winds of 25 mph or greater; https://www.weather.gov/oun/spotter-wwa-definitions.

[28] The AQI is an index for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health effects you may experience within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect public health .Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in this country. Source: https://www.airnow.gov/index.cfm?action=aqibasics.aqi.

FIGURE 5-12
IMPERIAL VALLEY AIR QUALITY INDEX IN WESTMORLAND
SEPTEMBER 19, 2016

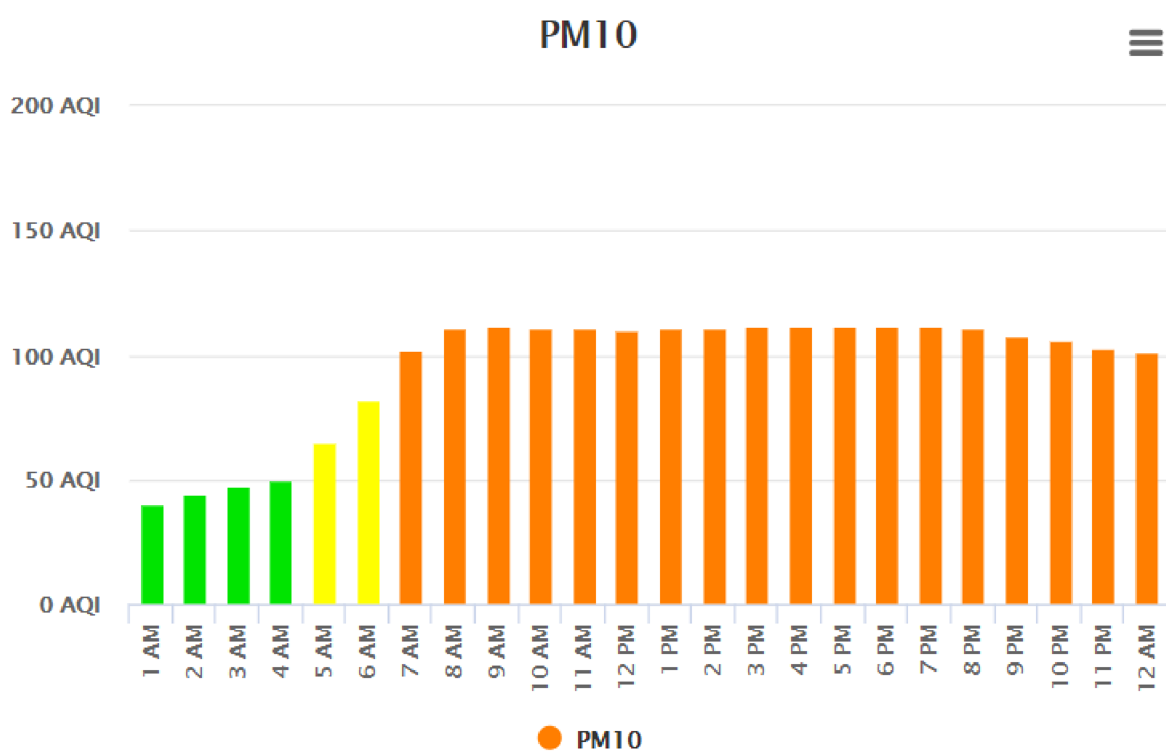

Fig 5-12: Reduced air quality is evident when warnings go from a good or green to unhealthy for sensitive receptors or orange level. Source: ICAPCD archives

V.2 Summary

The preceding discussion, graphs, figures, and tables provide wind direction, speed and concentration data illustrating the spatial and temporal effects of the virga that occurred when the intrusion of moisture from Hurricane Paine entered Imperial County. The information provides a clear causal relationship between the entrained windblown dust and the PM_{10} exceedance measured at the Westmorland monitor on September 19, 2016. Furthermore, the advisories and air quality index illustrate the affect upon air quality within the region extending from the southwest portion of Yuma County, Arizona, all of Imperial County, and the southern portion of Riverside County. Large amounts of coarse particles (dust) and PM_{10} where transported by gusty southerly winds into the lower atmosphere causing a change in the air quality conditions within Imperial County. The entrained dust originated from as far as the desert areas located south of Imperial County (part of the Sonoran Desert). Combined, the information demonstrates that the elevated PM_{10} concentrations measured on September 19, 2016 coincided with high wind speeds and that gusty southerly winds were experienced over the southern portion of Riverside County, southeastern San Diego County, all of Imperial County, and parts of Arizona.

FIGURE 5-13
SEPTEMBER 19, 2016 WIND EVENT TAKEAWAY POINTS

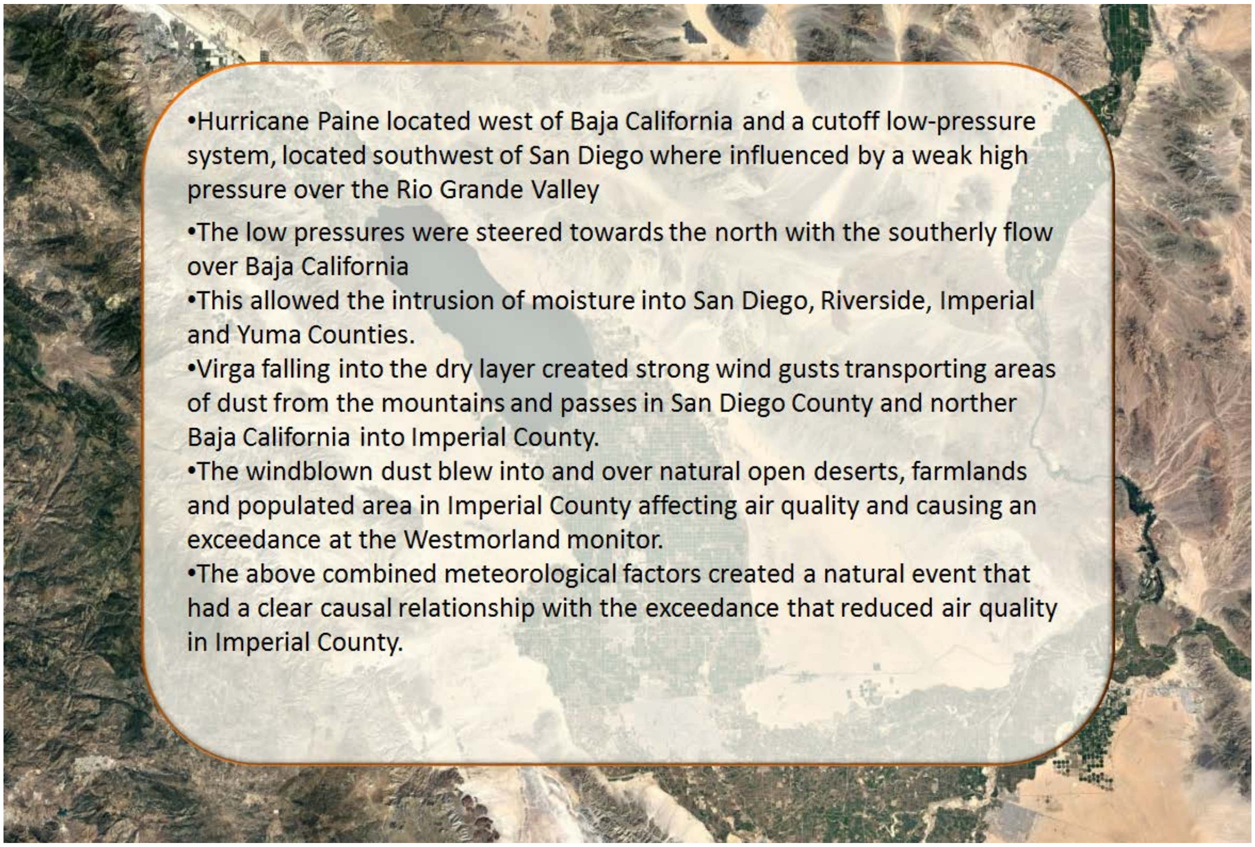

Fig 5-13: Is a summary of the meteorological conditions and facts that qualify the September 19, 2016 event, which affected air quality as an Exceptional Event.

VI Conclusions

The PM_{10} exceedance that occurred on September 19, 2016, satisfies the criteria of the EER which states that in order to justify the exclusion of air quality monitoring data evidence must be provided for the following elements:

TABLE 6-1 TECHNICAL ELEMENTS CHECKLIST EXCEPTIONAL EVENT DEMONSTRATION FOR HIGH WIND DUST EVENT (PM_{10})		DOCUMENT SECTION
1	A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s)	6-36
2	A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation	49-68; 70
3	Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times to support the requirement at paragraph (c)(3)(iv)(B) of this section	37-41; 70
4	A demonstration that the event was both not reasonably controllable and not reasonably preventable	42-48; 69
5	A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event	49-68; 70

VI.1 Affects Air Quality

The preamble to the revised EER states that an event is considered to have affected air quality if it can be demonstrated that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation. Given the information presented in this demonstration, particularly Section V, we can reasonably conclude that there exists a clear causal relationship between the monitored exceedance and the September 19, 2016 event, which changed or affected air quality in Imperial County.

VI.2 Not Reasonably Controllable or Preventable

In order for an event to be defined as an exceptional event under section 50.1(j) of 40 CFR Part 50 an event must be "not reasonably controllable or preventable." The revised preamble explains that the nRCP has two prongs, not reasonably preventable and not reasonably controllable. The nRCP is met for natural events where high wind events entrain dust from desert areas, whose sources are controlled by BACM, where human activity played litter or no direct causal role. This demonstration provides evidence that despite BACM in place within Imperial

County, high winds overwhelmed all BACM controls where human activity played little to no direct causal role. The PM_{10} exceedance measured at the Westmorland monitor was caused by naturally occurring strong gusty southerly winds that transported fugitive dust into Imperial County and other parts of southern California from areas located within the Sonoran Desert regions to the south of Imperial County. These facts provide strong evidence that the PM_{10} exceedance at Westmorland on September 19, 2016 was not reasonably controllable or preventable.

VI.3 Natural Event

The revised preamble to the EER clarifies that a "Natural Event" (50.1(k) of 40 CFR Part 50), which may recur at the same location, is an event where human activity plays little or no direct causal role. The event, along with its resulting emissions, is considered not playing a direct role in causing the emissions because anthropogenic sources are reasonably controlled therefore, meeting the criteria that human activity played little or no direct causal role. As discussed within this demonstration, the PM_{10} exceedance that occurred at Brawley on June 26, 2014, was caused by the transport of windblown dust into Imperial County by strong westerly winds associated with the passage of a trough of low-pressure that moved through the region. At the time of the event, anthropogenic sources were reasonably controlled with BACM. The event therefore qualifies as a natural event.

VI.4 Clear Causal Relationship

The time series plots of PM_{10} concentrations at Westmorland during different days, and the comparative analysis of different areas in Imperial and Riverside county monitors demonstrates a consistency of elevated gusty southerly winds and concentrations of PM_{10} at the Westmorland monitoring station on September 19, 2016 (Section V). In addition, these time series plots and graphs demonstrate that the high PM_{10} concentrations and the gusty southerly winds were an event that was widespread, regional and not preventable. Arid conditions preceding the event resulted in soils that were particularly susceptible to particulate suspension by the elevated gusty southerly winds. Days immediately before and after the high wind event PM_{10} concentrations were well below the NAAQS. Overall, the demonstration provides evidence of the strong correlation between the natural event and the entrained fugitive emissions to the exceedances on September 19, 2016.

VI.5 Historical Concentrations

The historical annual and seasonal 24-hr average PM_{10} values measured at the Westmorland monitors were historically unusual compared to a multi-year data set (Section III).

Appendix A: Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

This section contains forecasts issued by the National Weather Service and Imperial County on or around September 19, 2016. The data show a region-wide increase in wind speeds and wind gusts coincident with the arrival of dust and high PM_{10} concentrations in Imperial County.

Appendix B: Meteorological Data.

This Appendix contains the time series plots, graphs, wind roses, etc. for selected monitors in Imperial and Riverside Counties. These plots, graphs and tables demonstrate the regional impact of the wind event.

Appendix C: Correlated PM_{10} Concentrations and Winds.

This Appendix contains the graphs depicting the correlations between PM_{10} Concentrations and elevated wind speeds for selected monitors in Imperial and Riverside Counties. These graphs demonstrate the region wide impact of the wind event.

Appendix D: Regulation VIII – Fugitive Dust Rule.

This Appendix contains the compilation of the BACM adopted by the Imperial County Air Pollution Control District and approved by the United States Environmental Protection Agency. A total of seven rules numbered 800 through 806 comprise the set of Regulation VIII Fugitive Dust Rules.